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Department of Conservation and Natural
History Survey, cooperating. Edited by
T. G. Scott.

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MONTHLY WILDLIFE RESEARCH LETTER

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Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois	January 1958	Vol. 1, No. 1
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W-30-R-11 W. R. Hanson, R. F. Labisky

Nearly 450 hunters were interviewed, and 290 bagged pheasants were examined on the Sibley area during the 1957 hunting season. The age ratio of bagged cocks was 4.58 juveniles:1 adult, compared to 12.5 juveniles:1 adult in 1956. Differential shooting of juveniles did not occur. The hunters required about 3.5 hours to bag each cock, compared to 2.3 hours in 1956, and the hunters crippled and lost 24.4 per cent of the number of birds they bagged.

Analysis of data indicated that only 20.3 per cent of the cock population was harvested on the Sibley area during the 1957 hunting season. The estimate was based on the change between the preseason sex ratio of 70.4 cocks per 100 hens, obtained from the night-light trapping of 213 birds, and the postseason ratio of 56.1 cocks per 100 hens, obtained from roadside counts of 2,384 pheasants during December and January. Comparable data showed that 73.3 per cent of the cocks were harvested during the 1956 hunting season.

One hundred and seven pheasants were trapped on the Sibley area by night-lighting and were marked with plastic back-tags during December and January; these birds bring the total number of pheasants trapped and marked during the fall and winter of 1957-58 to 359.

A total of 315 observations on pheasants marked during 1957-58 were made during January, and in 240 observations (76.2 per cent) the birds were definitely identified. In addition, a total of 65 observations of pheasants marked during 1956-57 were made during January, and in 41 observations (63.1 percent) the birds were definitely identified.

W-42-R-7 R. D. Lord

The reproductive data gathered during the breeding season of 1957 were analyzed. The first signs of breeding occurred during the last week in February when 18 per cent of the females showed sites of implantation of zygotes in the uterus. The last pregnant females were found during the second week in September.

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Daylight roadside and nighttime spotlight censuses were made on the Sibley area. The number of rabbits observed in the roadside census increased to 0.32 per mile from 0.01 in December largely as a result of snow cover which increased visibility and caused the rabbits to move to the vicinity of farm buildings. The number of rabbits observed by spotlight census was down to 1.27 rabbits per mile from 1.66 for last month, possibly a reflection of winter mortality. The spotlight census is regarded as a more reliable method than the roadside census during most seasons and conditions.

Ten of thirteen cottontail embryos were received from a hunter who shot the female on January 17. The size of the embryos indicated that copulation had taken place about January 2 and that birth would have occurred about February 1. Thirty-four cottontails were collected during the last week in January to determine their reproductive condition. Three of the 20 males were reproductively active, but none of 14 females showed even preliminary preparation of the uterus for reproduction.

W-52-R-3*

P. Vohs, R. Conder

A series of observations concerning activities of bob-white quail, mourning doves, cottontail rabbits, and small mammals in wide-row and control plots was continued throughout the month. The frequent precipitation, which broke all previous annual records in 1957, has continued through January. Experiments with the dropping board method of determining populations of small mammals has been unproductive because of the abundance of rain.

The production of corn in the wide-row plots compared favorably with the control field yields during the 1957 growing season. Wide-row yields ranged from 94 to 112 per cent of the control field area production. Interseedings in the wide-row areas were an asset to the harvesting operations during the wet fall and early winter. While muddy fields of conventional corn defied harvesters, the footing provided by the interseeding allowed picking operations to be carried out in the wide-row fields. Cottontail rabbit utilization of the wide-rows exceeded by many times the use made of the control areas. Similar results are being recorded for bob-white quail and mourning doves.

W-55-R-2

F. Bellrose

As part of the winter inventory of waterfowl, as made by the Fish and Wildlife Service, we flew the Illinois and Mississippi valleys on January 13, 15 and 18. We found a large decrease in the numbers of ducks as compared with the previous year. The total for the state was 424,000 ducks, compared to about 2 million last year.

* Southern Illinois University, cooperating.

W-56-R-2

G. Sanderson, K. Johnson

Examination and marking of cavities continued on the raccoon-wood duck study areas at Havana. The locations of all trees with hollows observable from the ground have been recorded. The number of trees containing cavities suitable for wood ducks and raccoons marked thus far is as follows: Rountree Area - 7, Lakewood Area - 6, Heye Area - 1, Daniels Area - 6, and Headquarters Area - 6.

Visits were made to 20 furbuyers in 16 counties for the purpose of collecting raccoon bacula and getting data concerning furbuyers and the fur trade. Buyers contributed approximately 2,700 bacula for the study of age ratios. Thus far, 1,945 of these bones have been cleaned and the age determined. Of these 68.8 per cent were from young-of-the-year raccoons. Last year 70.1 per cent of 3,488 bones examined during the entire season were from juveniles.

A preliminary tabulation was made of the sex-ratio data collected during the 1957-58 season. It reveals that 51.4 per cent of 471 raccoons were females. There were 47 parous females (29.8 per cent) among 158 females examined. During the 1956-57 season, females comprised 48.4 per cent of 2,222 raccoons and 27.1 per cent of 299 females were parous.

None of these data, age ratio, sex ratio or percentage of parous females, appear to indicate a decline in the Illinois raccoon population at this time.

Two dead raccoons were found near Bloomington by a hunter-cooperator on January 6, 1958. The cooperator brought these animals to the University of Illinois diagnostic laboratory. These animals had six micrograms of lead per gram of liver tissue, a toxic amount. Also seen in these animals were "intracytoplasmic and intranuclear inclusions, similar to those seen in canine distemper." One sick young-of-the-year male raccoon caught in McLean County died in captivity 2 days after capture. This animal was negative for rabies and through an oversight in the diagnostic laboratory no further tests were made. From the symptoms exhibited, however, it seemed probable that this animal also died of lead poisoning.

W-61-R-1

F. Greeley, J. Ellis

A survey was designed for the winter pheasant count on the Neoga area. The area was divided into 512 plots, each 40 acres in size, and 104 of them were selected at random to be searched for pheasants. The sample was weighted according to the distribution of pheasants on the area. Ten sections were censused at the rate of 1 plot per section, and the remaining 23 sections were censused at the rate of 4 plots per section. The time required to search the plots was 72.75 man hours. Twenty-four pheasants (20 hens:4 cocks) were observed on the plots. These data have not been analysed statistically, but because about 20 per cent of the area was censused, the estimate for the entire study area would be roughly five times the number of pheasants observed, or 100 hens and 20 cocks. In addition to pheasants, three coveys of quail (totalling 34 birds) and 122 rabbits were observed during the course of the census.

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The fourth rural mail carrier roadside count of pheasants was prepared and carried out during January. The mail carriers made their counts from January 27-31. Fairly good snow cover was present north of a line from Peoria County to Ford County.

The first meeting of the Midwest Pheasant Council, on January 13-16, was attended by the project leader. Fifteen states were represented at the meeting held at Madelia, Minnesota. The discussion centered primarily on the organization and duties of the council, but considerable time was spent discussing pheasant research activities of the various states and their research needs.

1. The purpose of this document is to provide a comprehensive overview of the current status of the project and to identify the key areas that require further investigation and development.

2. The project has been initiated in response to the growing need for a secure and reliable communication system that can be used in a variety of environments.

3. The project is currently in the planning phase, and the following tasks are being completed:

- Conducting a detailed analysis of the requirements and constraints of the system.
- Developing a preliminary design and architecture.
- Identifying the resources and personnel required for the project.

4. The project is expected to be completed by the end of the year, and the results will be presented to the relevant stakeholders for their review and approval.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

February 1958

Vol. 1, No. 2

W-30-R-11

W. R. Hanson, R. F. Labisky

Night-light trapping was completed on the Sibley area for the fall and winter of 1957-58, 374 pheasants being trapped and marked with plastic back-tags during this period. Trapping mortality was only 2.6 per cent.

Marked pheasants were seen on 155 occasions during February, and the pheasants were individually identified in 106 (68.4 per cent) of these observations. Pheasants which were marked during the fall and winter of 1956-57 comprised 10.3 per cent of the total observations.

Pheasant behavior was well advanced into that of the early breeding season during February on the Sibley area; this same stage in the breeding cycle was not reached until early March in 1957. Crowing counts during late February reached a frequency of 5.5 calls per 2-minute period; cock calls occurred infrequently during this same period in 1957. A definite segregation of sexes occurred about mid-February, but the early breeding season movement or "shuffle" was not apparent. Adult cocks released courtship behavior (involving hens) and antagonistic behavior (involving cocks) patterns early in February; juvenile cocks exhibited aggressive behavior patterns later than did the adults, indicating a less advanced state of sexual motivation. Few social interactions were noted among hens. Among cocks, adults asserted dominance over juveniles in all encounters. All interactions between sexes involved only adults, and hens were not responsive to cocks. These data substantiate previous findings (1957) which showed adults to be earlier and more aggressive breeders than juvenile pheasants.

The yield of corn adjacent to five multiflora rose hedges and that of corn on the opposite, clean edge of the field were recorded in fall of 1957. The corn yield adjacent to the hedges averaged about 13 per cent lower than that of the open edge.

W-42-R-7

R. D. Lord

Early morning roadside and nighttime spotlight censuses of rabbits on the Sibley area indicated a decline in population. The roadside census figure was down to 0.15 rabbits per mile from 0.36 last month. Some of this decline resulted from decreased visibility when snow disappeared. The spotlight census

THE UNIVERSITY OF CHICAGO

OFFICE OF THE DEAN OF STUDENTS

CHICAGO, ILLINOIS

Dear Mr. [Name]:

I am writing to you regarding your application for admission to the University of Chicago for the fall semester of 19[Year]. Your application has been reviewed by the admissions committee, and we are pleased to inform you that you have been accepted for admission.

You will be required to complete certain prerequisites before you can enroll in the fall semester. These prerequisites include [List of prerequisites].

We are pleased to hear that you are interested in the University of Chicago. The University is a leading institution of higher learning, and we are confident that you will find it to be a most rewarding experience. We are pleased to hear that you are interested in the University of Chicago. The University is a leading institution of higher learning, and we are confident that you will find it to be a most rewarding experience. We are pleased to hear that you are interested in the University of Chicago. The University is a leading institution of higher learning, and we are confident that you will find it to be a most rewarding experience.

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figure was down to 0.56 rabbits per mile from 1.27 for last month. Some of this decline was caused when adverse weather inhibited rabbit activity.

Examination of 45 rabbits from central Illinois indicated initiation of the breeding season during the last week of this month. Thirty-three were males, all in full breeding condition. None of the 12 females contained embryos or showed sites of implantation of the zygote on the uterine mucosa, but all showed preparation of the uterus for breeding. Three had ovulated indicating that copulation had occurred because rabbits are induced ovulators.

W-52-R-3*

P. Vohs, R. Conder

The first utilization of a wide-row field by Canada geese during 1957-58 occurred at the Bradley area on February 19, 1958. The geese fed at night under clear skies. An accurate estimate of their numbers could not be made. By February 24, they had eaten the waste corn, and, in addition, much of the interseeding of yellow sweet clover which was showing spring growth. Waste grain was still evident in the control field. Systematic counts revealed 0.04 goose droppings per square foot in the wide-row field and none in the standard interval control field.

In the Little Grassy Area, counts revealed 0.31 rabbit pellets per square foot in the control field as compared to 1.11 in the wide-row field with an interseeding of millet-ryegrass-yellow sweet clover and 2.06 in the Korean lespedeza-orchardgrass-red clover interseeding. In the Bradley area, a decrease in the pellet count seemed to indicate that utilization of the interseeding and waste corn in the wide-row field by geese had reduced its attractiveness for rabbits. The count of 0.99 pellets per square foot in the wide-row field, however, was still more than three times the number (0.31) obtained in the control field.

W-55-R-2

F. Bellrose

The first "spring" waterfowl census was made on February 25, 1958. It revealed that the spring flight of ducks was just commencing to appear in the southern end of the flight route. In comparison with waterfowl populations found on February 28, 1957, those on February 25, 1958 were much lower, indicating that the abnormally cold weather in February of this year, materially retarded the initiation of migration.

W-56-R-2

G. Sanderson, K. Johnson

The search for tree dens which could be used by raccoons and wood ducks was continued on the study areas near Havana. Thus far, approximately 65 cavities have been measured and recorded.

* Southern Illinois University, cooperating.

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THE JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION
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Two sick raccoons were examined, one from near Penfield in Champaign County and the other from near Danvers in McLean County. Chemical analysis of the liver of the first was negative for heavy metals and no further tests were made. Chemical examination of the second revealed the presence of arsenic in the liver tissue but no lead compounds.

A search of hollow trees on the 815-acre study area in Piatt County revealed that most of the 56 raccoons and 91 opossums caught, marked and released there last year had migrated to adjoining areas or died. This area, mostly floodplain, is deficient in food in winter. Return migration is expected.

W-61-R-1

F. Greeley, J. Ellis

Most of February was spent compiling the rural mail carrier reports of pheasants seen from January 27-31, 1958. Incomplete tabulation showed that 76 per cent of 1,385 carriers responded and that 97.7 per cent of the returns were usable.. Pheasants were seen in 64 of 76 counties compared to 55, 63 and 64 counties in February, April and August, respectively, of 1957.

The mail carriers drove 248,134 miles and saw 38,010 pheasants during the 5-day count. In the 64 counties where the pheasants were seen the carriers drove 215,448 miles and saw an average of 18.5 birds per 100 miles compared to 8.4 in February, 1957. The marked increase in the 1958 count probably resulted from the widespread snow cover which improved visibility.

The winter sex ratios indicated a decline in the rate of harvest of cocks from that of 1957, assuming the pre-season sex ratio was the same in both years. In 1957, 27.7 per cent of the birds seen by mail carriers were cocks; in 1958, 32.2 per cent were cocks. This change in sex ratio occurred in spite of the fact that hens were probably more easily seen against the snow cover of 1958.

A survey was designed for the winter pheasant count on the Bellmont area. The area was divided into 228 plots, each 40 acres in size. Fifty-seven were selected at random to be searched. The rate of sampling was four plots per section. The time required to census the plots was 46.5 man hours. Eight pheasants (6 cocks:2 hens) were observed on the census plots. These data when analysed statistically produced an estimate of 32 ± 43 pheasants for the 9120-acre area. The estimate of cocks was 24 ± 32 and of hens was 8 ± 32 .

4. The fourth part of the document discusses the implications of the findings and provides recommendations for future research. It suggests that further studies should be conducted to explore the underlying mechanisms of the observed phenomena.

5. The fifth part of the document is a conclusion that summarizes the main points of the study. It reiterates the importance of the research and the need for continued investigation in this field.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

March 1958

Vol. 1, No. 3

W-30-R-11

W. R. Hanson, R. F. Labisky

Breeding activity among pheasants on the Sibley area was somewhat retarded during early March but progressed rapidly during the latter portion of the month. Because photoperiod is important in triggering sexual activity in birds, the unusually low amount of sunlight (or extended periods of cloudiness) characteristic of early March probably caused the lag in the breeding cycle. Social interactions among and between the sexes were common; adult pheasants were more aggressive breeders than juveniles. The behavior of adult cocks was indicative of territory establishment during late March; harem formation was not evident.

Crowing counts on the Sibley area reached a frequency of 23.9 cock calls per 2-minute period in late March; comparable counts for 1957 showed a frequency of only 10.9 calls per 2-minute period. The increased frequency of cock calls in 1958 mainly reflects the increased numbers of cocks in 1958.

W-42-R-7

R. D. Lord

Data from the 1957-58 season on the population dynamics of rabbits on the two 100-acre study areas at Allerton Park which are being investigated to determine the role of hunting in the annual turnover were analyzed. One area is hunted and the hunters are closely checked. The other area is a wildlife sanctuary and is not hunted.

The productivity of rabbits on the hunted area proved to be somewhat greater than that of the unhunted area in spite of a smaller spring population. The population in fall was 2.6 rabbits per acre on the hunted area and 2.4 rabbits per acre on the sanctuary.

By late winter, the population on the hunted area had dropped to 0.3 rabbits per acre and on the sanctuary to 0.6 rabbits per acre. The winter mortality on the hunted area was 88 per cent of the fall population and less than 75 per cent on the sanctuary.

Hunters harvested 36 per cent of the fall crop and were responsible for at least 40 per cent of the winter mortality on the hunted area. Hunters averaged 0.34 rabbits per gun-hour and hunted an average of 2.9 hours to get a rabbit this year, a 53 per cent increase over the effort required last year.

A paper entitled "The importance of juvenile breeding to the annual cottontail crop" was given at the North American Wildlife Conference in St. Louis. The paper was well received and was acknowledged to have been one of the better papers presented at the conference.

W-52-R-3*

P. Vohs, R. Conder

Wildlife observations and measurement of the spring growth of the interseedings were continued during the month. At the Little Grassy area, 31 mourning doves, 10 bobwhite quail, and 1 deer were observed in the wide-row fields. The only game species seen in the control field were two mourning doves. On the Bradley area, three rabbits were seen in the wide-row field; none were observed in the control field.

A paper entitled "Wildlife and Wide-Row Corn" was presented at the Forage Research Conference at the University of Illinois on March 20.

W-55-R-2

F. Bellrose

Waterfowl censuses were made on March 5, 6, 10, 13, 19, and one will probably be made on March 28. As a result of unforecasted snow storms, three censuses were terminated before completion.

A comparison of waterfowl populations in March of 1958 with those of other springs, reveals that populations of mallards and pintails are at exceptionally low levels. Other ducks are from 1 to 2 weeks behind time schedules of other years.

An example of the decrease in mallards is shown by a peak population of 511,000 in 1957 as opposed to 115,000 in 1958. Pintails numbered 87,000 at their peak population in 1957 and only 9,000 in 1958. Poor food conditions and a rapid push of ducks northward with a warm movement of air might have resulted in the low spring populations of mallards and pintails in Illinois.

W-56-R-2

G. Sanderson, K. Johnson

An unmarked, sick, adult male raccoon was picked up on the Allerton Park area on March 19, 1958. It died in captivity four days later and was taken to the University of Illinois Diagnostic Laboratory. It proved to be negative

*Southern Illinois University, Cooperating.

for poison by lead or arsenic, and for negri bodies indicating rabies.

Continued searching for den trees on the raccoon-wood duck study areas near Havana brought the total number located to 102. The number of acres per den tree is 5.5. Treatment of den trees with Tanglefoot as a means of keeping raccoons from using the trees was begun.

Of four female raccoons examined for breeding condition, two were pregnant. One of the pregnant females caught in late February in Piatt County had three uterine swellings indicating the presence of newly implanted embryos. The second pregnant female, taken in Champaign County on March 13th, had 5 large embryos. It is estimated that these young would have been born no later than the end of March. Three adult males were sexually active.

W-61-R-1

F. Greeley, J. Ellis

The rural mail carriers' counts of pheasants in January were mapped. Thirty-three per cent of the 38,188 birds tallied by the carriers were seen in Ford and Livingston counties; a year ago 40 per cent were seen in these two counties. Other areas with high counts were western Iroquois county, eastern McLean, and Marshall, Woodford, LaSalle, DeKalb, McHenry and Stephenson counties. Preparations were begun for another mail carrier count to be made in late April. All the rural mail carrier data are now being edited for machine processing.

Crowing counts were initiated on the Bellmont and Neoga study areas. During six counts made at Neoga, the rate of crowing increased as the length of daylight increased. Pheasants were not heard to crow on a count attempted on March 7, while on March 28, 16 individual cocks were heard to call 22 times in 12 stops. At Bellmont on March 26, three cocks were heard to call four times in 15 stops.

Data obtained during the hunting season on the Neoga area and other information were used to determine the preseason population (76-79 cocks: 68-84 hens), the post season population (14-17 cocks: 68-84 hens), the per cent of the cocks harvested (78-82 per cent), and the number of young produced per adult hen (4.3).

During the period from April - November, 1957, pheasants released as adults in the spring and summer of 1956 were seen in greater percentages than those released as juveniles during the same period. Cocks released by the gentle method were seen in greater percentages than were cocks released by the violent method. The reverse was true in the case of hens.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

April 1958

Vol. 1, No. 4

W-30-R-11

W. R. Hanson, R. F. Labisky

The report on the cover requirements of pheasants on the Sibley area was completed. During the period of initial nest establishment in 1957, 52.4 per cent of the 132 feeding pheasants observed were associated with forage-crop cover, although such cover made up only 27.9 per cent of that surveyed. Plowing made up 33.3 per cent of the area during spring and was frequented by 33.6 per cent of the 156 loafing pheasants observed. Heavily pastured or lightly pastured forage crops were frequented more often than moderately grazed forage crops. In August, 67.1 per cent of the 934 feeding pheasants were associated with woody cover; in January, only 65.8 per cent of the 307 loafing pheasants were associated with such cover. Self-established clumps of native woody plants were used more during both of these seasons than were hedges of osage orange or multiflora rose.

The occurrence of warm, clear weather in early April triggered an increase in the sexual activity of pheasants on the Sibley area. Cock crowing counts increased from 24.8 calls per 2-minute stop in early April to 35.7 calls per stop in late April. Decreased tolerance among cocks early in the month resulted in the break-up of cock groups, and movement activities among hens also increased during this period. Harem formation was common by midmonth. Hens first exhibited breeding displays to cocks about midmonth, but copulation was not frequent until April 20-25. Early nests were already established by April 15.

Few cock territories have been established during the current breeding season, whereas territories were common by this time in 1957. Large breeding display areas, often 100 acres or more in size, with indistinct boundaries have tended to replace cock territories. The display areas are often frequented by several cocks (some with harems), and conflicts between cocks are common, although there are no defined boundaries of defense. The population of hens in 1957 and 1958 was nearly the same, but cocks comprised 36.1 per cent of the pre-breeding population of pheasants in 1958, compared to only 19.0 per cent in 1957. These observations indicate the inability of cocks to defend territories effectively and to maintain harems of hens successfully under conditions of high densities of cocks.

W-42-R-7

R. D. Lord

To determine the relationship of food to mortality and condition of cottontail rabbits in winter, a constant supply of commercial, balanced-ration, rabbit food was maintained in feeders distributed at the rate of one for every 2

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acres over the study area. The feeders were checked for use after every tracking snow, and it was found that at least 86 per cent of them had been visited by rabbits. Rabbits were censused in the late fall and late winter and the intervening mortality determined. Close agreement was found between this mortality and that of the previous year. The average early winter and late winter weights were compared and checked with the previous years' weights, and the weights of the rabbits in late winter were found to have been significantly heavier the year of feeding. A comparison was made of damage done to planted trees for both years, and the extent of damage was found to be significantly lower during the year in which artificial feeding was practiced.

The rabbits used the food and received benefit from it, yet mortality occurred at the same rate as that of the previous year. Food apparently was not the critical factor in winter mortality. Because the mortality rate was the same for both years even though the population densities varied 22 per cent it appeared that the etiological agent was density independent.

Reproduction seems to be up ~~this~~ year over last year. In March a sample of 61 rabbits showed 96 per cent of the females pregnant as opposed to 74 per cent last year. In April, a sample of 63 rabbits showed 79 per cent of the females pregnant compared to 36 per cent last year. The average litter size has remained about the same for both years, 4.3 young per pregnant female in March and 5.6 young per pregnant female in April.

W-52-R-3*

P. Vohs, R. Conder

Cottontail rabbits continued to utilize two of the three wide-row fields much more intensively than the adjacent control fields. Pellet census data show 0.69 pellets per square foot and 0.29 per square foot at the Bradley wide-row and control fields respectively. At the Little Grassy area, 0.95 pellets were located per square foot in the Korean lespedeza-red clover-orchardgrass wide-row field, 0.20 in the control field, and 0.19 for the millet-yellow sweetclover-ryegrass interseeded wide-row field. No spring growth of the yellow sweetclover or ryegrass was evident and food and cover was equal to that provided by the control plot.

W-55-R-2

F. Bellrose

Three waterfowl population surveys were made in April on the 8th, 14th, and 30th. In general, waterfowl populations were appreciably lower than during the same period in 1957. Only the lesser scaup in the Mississippi Valley and the shoveler appeared in greater numbers this April. During March, 1958, the spring waterfowl flight was 2 weeks behind schedule, but during the first half of April the flight accelerated to seasonal averages as the colder than normal weather became warmer than normal.

W-56-R-2

G. Sanderson, K. Johnson

During this period 15 raccoons were live-trapped on the Allerton Park study area in Piatt County; 7 were females. Ten were captured for the first time. During the same time, 22 opossums were live-trapped; 11 were females. Sixteen of these opossums were caught for the first time, and six were recaptures. One of the recaptured males weighed 1.3 pounds when first trapped on June 30, 1957. This animal was retrapped 17 times between then and the date of the last capture in 1957 (October 16) when it weighed 3.5 pounds. This opossum was nearly always taken in one of two adjacent traps up to October 16, 1957. Between that date and April 9, 1958, when it was again taken, it had moved approximately 2 miles, air-line distance, west along the river and crossed to the north side.

One female opossum trapped on April 4th had no young in the pouch; however, a female trapped on April 10th did have young, as did the eight other females subsequently trapped during the month. A method was developed for marking these young, so their mortality rates, movements, and dispersal can be studied. The female opossum with young in the pouch is placed with back down on a wide board with several holes in it. Each foot and the head are tied separately with a leather thong. The pouch is opened, and the young are pulled out one by one taking care not to dislodge them from the nipples because this would be fatal. With the aid of forceps and a pair of small surgical scissors, one toe is clipped from each of the embryo-like young. The same number toe is clipped on all the members of an individual litter. Thus, while it will not be possible to identify individuals, the members of a litter can be identified. If these animals are recaptured, regular tags will be placed in their ears. This method was not developed when the first litters were found, but thus far 50 pouch young in six litters have been toe-clipped. This procedure appears to have little effect on the young. Only rarely can even a trace of blood be seen. The toes which are removed are only slightly larger than the head of a pin.

Continued searching for natural cavities on the raccoon-wood duck study has brought the total number of cavities located to 107. Thirty trees on the control areas have been banded with Tanglefoot as a means of raccoon control. Three of these 30 trees now contain wood duck nests; these trees will be watched closely to determine if the Tanglefoot is an effective raccoon barrier. The first examination of the cavities was begun. Eight wood duck nests were located in natural cavities and two additional nests were found in old style (non-Survey) nest boxes. Four litters of raccoons were located.

Tabulation was completed of age and sex ratio data collected at fur houses and from cooperators during the 1957-58 season. These data show that females comprised 57 per cent of the harvest, an increase over the 48 per cent of 1956-57 season and the 53 per cent of the 1955-56 season. Of males, young-of-the-year animals comprised 69 per cent of the animals harvested compared to 70 per cent in the 1956-57 season and 72 per cent during the 1955-56 season. Twentysix per cent of the females examined had given birth to litters compared to 23 per cent the previous year. Based on placental scar counts, the litters averaged 3.6 young compared to 3.6 for the 1956 breeding season and 3.7 for the 1955 season. The lack of a marked trend in the age and sex ratios and average litter sizes, plus other observations made during the past three seasons, indicate that the Illinois raccoon population level is still quite high.

W-61-R-1

F. Greeley, J. Ellis

Editing of rural mail carrier data for IBM processing was continued. On the basis of state-wide sex ratios obtained by the rural mail carriers, from 35-47 per cent of the cocks were harvested during the 1957 season; in the 1956 season from 48-68 per cent of the cocks were killed. The fifth roadside count of pheasants was conducted by the rural mail carriers from April 21-26, 1958.

Collection of road-killed pheasants for analysis of bone-ash and of diet was continued. The first hens that had laid eggs were brought in on April 22. This is indicative of the lateness of the year, although biologists and wardens may have some road-killed hens in storage that were laying earlier than April 22. Other hens brought in so far have had maximum yolk sizes of about 5 mm., indicating the lateness of development.

Crowing counts were continued during the month at Bellmont and Neoga. At Bellmont on April 8, an average of 3.1 cock calls per stop were heard, from 24 individual cocks. On April 18, an average of 5.7 cock calls per stop were heard from 36 individual cocks.

Six crowing counts were completed at Neoga during April. Average cock calls per stop ranged from 0.82 to 2.6 and the number of individual cocks recorded during the counts ranged from 8 to 24.

Twenty-eight cocks and 18 hens (0.64 female:1 male) were observed at Bellmont during the month. Thirty-two of the 46 pheasants were aged as being juveniles or adults by the presence or absence of bands. The age ratio among the cocks was 1.2:1 (Juveniles:Adults) and among hens was 5:1. At Neoge, 26 pheasants (17 females to 9 males) were observed. The sex ratio was (1.9 females to 1 male). Four marked pheasants (3 females and 1 male) were recorded. Two of the hens were hatched in 1955 and one in 1956 and were released on the area in 1956. The cock was from the first release made in 1956.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

May 1958

Vol. 1, No. 5

W-30-R-11

W. R. Hanson, R. F. Labisky

The Job Completion report on the population characteristics of pheasants of the Sibley study area was finished during the month. Field study of pheasant nesting was conducted; the study plots were cover mapped, and the strip cover was searched for nests.

W-42-R-7

R. D. Lord

On the 100-acre Robert Allerton Park study area on which hunting is done, the sites of the deaths of rabbits were located from mats of rabbit hair. Thirty-two such mats were found during two searches made in December and March. Two of 22 hair mats (9.1 per cent) contained shot. Controlled experiments determined that there was a 7 per cent loss to be expected in the technique used for locating shot in hair mats. Thus, a maximum of 16.1 per cent of the hair mats contained shot.

Further calculations indicated that a maximum of 8.8 per cent of the winter mortality on the study area was due to crippling loss.

X-ray photographs of 34 rabbits trapped alive during the hunting season revealed only one carrying shot. Other X-rays of 7 rabbit carcasses found on the study area during the season showed no shot. Autopsies of rabbit carcasses revealed hemorrhagic pneumonia, suggesting a virus as the etiological agent.

Research is being started on the nature of fecal pellets of cottontails and the rate of their decay. Among the surprising preliminary findings is the discovery that male rabbits have pellets 29 to 47 per cent smaller than females. This puts the male pellets in the same size class as those of juveniles one or more months old, thereby invalidating the work of some earlier workers who determined the proportion of juveniles in the late summer population on the basis of pellet size.

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W-52-R-3*

P. Vohs, R. Conder

A total of 19 quail and 6 doves was seen in the wide-row corn field interseeded with Korean lespedeza, red clover, and orchardgrass, at the Little Grassy area. No birds were flushed from either the control plot or the wide-row field where the millet-ryegrass-yellow sweetclover interseeding failed to show any sign of spring growth. Eight observations of quail were made in the wide-row plot at the Bradley Area during the month; no quail were sighted in the control plot.

The wide-row field interseeded with a mixture containing Korean lespedeza, red clover, and orchardgrass at the Little Grassy Area is providing excellent wildlife cover and an abundance of forage is available to cottontails. The Korean lespedeza in the Bradley Area wide-row plot initiated growth during the month and is providing cover and food for cottontails. No yellow sweet-clover plants were visible in the field, however.

A brief report on the values of wide-row corn to wildlife was presented to 21 members of the Oraville Sportsmen's Club.

W-55-R-2

F. Bellrose

This project was inactive during May.

W-56-R-2

G. Sanderson, K. Johnson

Thirty-one wood duck nests were located in natural cavities: 26 on the study areas and 5 off. Of these, 11 have been destroyed, 3 were deserted, 5 have hatched successfully, and 12 are still being incubated.

Thirty-one cavity-trees have been banded with Tanglefoot as protection against raccoons. Ten of the nests observed were in these trees. Five of the 10 nests are being incubated, 2 were destroyed by squirrels, 1 was destroyed by a bird, 1 was deserted, and 1 was an unincubated dump nest.

There was evidence of a raccoon climbing through the Tanglefoot on one tree and entering a cavity; however, the cavity did not contain a wood duck nest.

Thirty-four raccoon captures were made in live traps on the Allerton Park study area. These represented 25 different animals. Twelve males and three females were caught for the first time. One recaptured female was first marked during 1957, and the other recaptured female was first caught this year. The latter female has been trapped a total of seven times. Six of the recaptured males were first caught and marked in 1957 and the other two were first caught this year.

*Southern Illinois University cooperating.

Of 56 raccoons marked on this study area in 1957, 19 animals (34 per cent) have been accounted for. Hunters harvested 10 (18 per cent) and 9 have been retrapped this year.

Thirty-five opossum captures were made on the study area during the month. These represented 21 different animals and 14 recaptures. Six males and six females were caught for the first time and nine were recaptures. A total of 64 of "pouch-young" in eight litters have been toe-clipped this year.

Two litters of raccoons were born in captivity to females which had been previously examined by laparatomies.

To determine whether captive raccoons which do not voluntarily mate a second time in the same season can be "forced" to do so, captive females were injected with pregnant mare serum (P.M.S.) which contains both follicle-stimulating hormone and luteinizing hormone. One female raccoon treated with this serum apparently ovulated many eggs as indicated by the presence of 16-18 corpora lutea in each ovary. Further investigation is necessary before this technique is refined enough to cause ovulation and implantation at will in the raccoon.

W-61-R-1

F. Greeley, J. Ellis

The rural mail carrier pheasant counts for January and April 1958 were placed on IBM cards so that population indices for 1,261 townships can now be computed by machine. Editing of three pheasant counts made in 1957 was nearly completed, and recording of the data on punch cards was begun. Programming for classification of the township pheasant population indices by soil regions was also initiated to permit computation of population indices for each region.

The project leader made a 4-day trip to survey the pheasant range in Indiana, May 19-22. The best pheasant range in Indiana consisted of soils and habitat extending for short distances into Indiana from Illinois, Michigan, and Ohio; it supported far less birds than are found at the Sibley study area. The forest soils lying between the areas of best range support very few pheasants, especially in the absence of willow-cattail sloughs.

Crowing activity of pheasants decreased on the Neoga and Bellmont areas as the month progressed. Counts taken the first week of May at Neoga averaged 1.75 calls per stop, and 0.92 the last week. At Bellmont, an average of 3.3 cock calls per stop was recorded May 9, and 1.9 on May 16. The peak of crowing on both areas occurred in mid-April. At Neoga, 2.69 cock calls per stop were recorded April 12. At Bellmont 5.7 were recorded April 18.

The first pheasant brood of the year was observed at Neoga on May 21: hen with nine 1-week old chicks. Another brood of at least three chicks was reported by a farmer.

A pheasant nest containing 17 eggs was found by farmers at Bellmont in the first week of May. The nest was examined on May 16 and only the remains of one shell was found.

The final three tons of agricultural limestone was distributed in piles along accessible fencerows on the Neoga area.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

June 1958

Vol. 1, No. 6

W-30-R-11

W. R. Hanson, R. F. Labisky

Studies of the reproductive ecology of pheasants on the Sibley area were continued. Hayfields not scheduled for mowing, strip-cover, and pastures were searched for pheasant nests until about the last 5 days of the month when the mowing of hay became general; after that, the search for nests was moved into the mowed hayfields. In 1958, the main period of hay cutting occurred several weeks later than usual because of frequent rains. Up to the end of the month, the number of pheasant nests found on the randomized plots was greater than the number of nests found there during a comparable period in 1957. Crowing counts were continued at the rate of two per week when weather permitted; on the last count, 16.5 calls per 2-minute period were heard, a relatively intense rate of crowing for this period of the year.

In 1957, nests established in hayfields contributed 48.5 per cent of the total number of hatched chicks on the study area. Twenty-three per cent of the hatched chicks were produced in oatfields, and 16.7, 10.1 and 1.8 per cent in strip-cover, pastures, and non-agricultural areas, respectively. Thus, about 80 per cent of the annual hatch of pheasant chicks on the Sibley area was produced on land under cultivation.

The Sibley area is subjected to two different types of land-use management. About 44 per cent of the area is owned by the Hiram Sibley estate and is tenant-farmed, primarily under the directorship of a farm manager; the remainder of the area is privately owned and is subjected to various programs of farm management. The management policies followed on the Sibley area have resulted in greater acreages of row crops and hay and less pasture on the estate farms than on other farms in the area. Thus, while both of these farm management categories have been on a cash-grain basis with some livestock production, the latter has taken a much more prominent place on the non-estate farms than on the estate farms. What does this mean to pheasants? With respect to pheasant nesting in 1957, estate farms yielded 33.5 per cent more established nests and 55.6 per cent more successful nests per unit of area than did non-estate farms.

1-42-R-7

On the two 100-acre study areas in Robert Allerton Park, the evaluation of cover and management practices is being based primarily on the comparative productivity of cottontails. The 4-H area, planted to 36 acres of evergreen and deciduous trees, is made accessible by mowing wide paths between the blocks of planted trees. The sanctuary area is being allowed to succeed to deciduous forest. The productivity of the rabbits on the unhunted sanctuary is only 30 per cent of what it is on the 4-H area.

Further studies on the relation of rabbits to cover showed a correlation between the density of rabbits in a large, open field and the number of feet of mowed path per acre in this field. It is believed that the mowed paths permit more rabbits to utilize the center of this field.

Counts of rabbit pellets on 5,400 quadrats in corn and soybeans at Sibley last year indicated that rabbits used corn twice as much as they did soybeans during the peak of the vegetative development of both crops. The difference was statistically significant.

The latest findings in the fecal pellet investigations indicate that females deposit, on the average, 20 more pellets per day than do males. The decay rate of male and female rabbit pellets in April was 20 per cent per day. In May the decay rate of female pellets dropped to 7.7 per cent per day, while the rate of decay of male pellets remained 20 per cent per day.

W-52-R-3*

P. Vohs, R. Conder

The final report of the wide-row corn project is being prepared and will be completed during the early part of July. The review of literature on wide-row corn is being brought up to date.

Limited field observations were conducted during the month. Observations of quail in the Korean lespedeza-orchardgrass-red clover interseeding at the Little Grassy area totaled 12; 4 additional observations were made in the wide-row field where the interseeding of millet, yellow sweetclover, and ryegrass did not recover this spring. At the Bradley area, observations of quail totaled 10 in the wide-row field where the Korean lespedeza had reached a height of 8 inches. No quail were observed in either of the control plots.

1-55-R-2

F. Bellrose

This project was inactive during June.

W-56-R-2

G. Sanderson, K. Johnson

Data from the live-trapping activities on the 1,565-acre study area in Piatt County have been summarized. The data show that hunters and trappers harvested at least 18 per cent of 56 raccoons marked during 1957. Twenty-seven

per cent of the animals which were marked young-of-the-year were harvested, but only 9 per cent of the older animals were harvested.

By using the total number of animals marked in 1957 and the number of marked and unmarked animals caught in 1958, it was estimated that there were 170 raccoons on the study area as of October 31, 1957, a density of 73 raccoons per square mile.

Hunters and trappers were known to have harvested only 8 per cent of the 89 opossums marked in 1957. This probably resulted from the low pelt value of opossums and lack of sporting interest in the species. It was estimated that there were 432 opossums on the study area as of October 30, 1947, a density of 177 animals per square mile.

Seven wood duck nests were located in natural cavities in June bringing the total number of nests located in the study to 38. Thirty-one of these were on the study areas, and seven were outside the study areas. Of the 38 nests, 4 are still being incubated; 13 have hatched; 17 were destroyed (one by wind, the others by predators); 3 were deserted; and 1 was an unincubated dump nest. Of the 10 nests in the Tanglefoot-banded unit, 5 have hatched; 2 were destroyed by squirrels; 1 was destroyed by a bird (probably woodpecker); 1 was deserted; and 1 was an unincubated dump nest.

The survey of natural cavities has revealed one cavity per 4.9 acres; 22 per cent of them have been used by wood ducks. Twenty-three per cent of the natural cavities have been used by animals other than wood ducks. Thirty-two per cent of the nest houses on the same areas have been used. Thirty-three per cent of the nests in natural cavities were successful as compared with 75 per cent successful in houses. Fox squirrels accounted for 43 per cent and raccoons 36 per cent of the nests destroyed in unprotected (unbanded) natural cavities. Raccoons destroyed 67 per cent of nests and bull snakes 33 per cent of the total destroyed in nest boxes.

W-61-R-1

P. Greeley, J. Ellis

During June, crowing cocks were located on the Belmont Study area by triangulation, the regular cock-crowing counts were made, and searches were made for hens, broods, and nests. Seven crowing counts were conducted during the month. The average number of cock calls and cocks per stop was 1.5 and 1.2 respectively. Crowing activity declined slightly as the month progressed. Fifty-one cock pheasants were located on the area; 28 were identified as being either survivors of the original release or birds hatched on the area, as indicated by the presence or absence of leg bands. Eleven of the 28 cocks (39 per cent) were survivors of the original release. Nineteen hens were located, and twelve pheasant broods were observed. Average brood size was 4.8 chicks, and the average estimated age at the time they were found was 3.6 weeks.

At Neoga, 16 pheasant broods have been located or reported by farmers, 13 of them in June. Average brood size for all the broods was 8.3 and 7.4 for

Also, average age of broods observed at Neoga was 4.1 weeks for all broods and 4.7 weeks for those recorded in June. Rainfall at Neoga during the month was 5.69 inches. Hay mowing was delayed, and only 60 per cent of the hay was cut for the first time by the end of the month. Five hens were reported killed during the haying operations.

The distribution of pheasants in Illinois, based on rural mail carrier counts, was summarized during the month. Since February, 1957, five counts, each lasting 5 days, have been made. A total of 97,079 birds was seen by the carriers while driving 1,097,759 miles (8.8 pheasants/100 miles).

Certain biases in the sex ratios and total counts were noted. These arose from the differential conspicuousness of the sexes, the occurrence of snow, seasonal changes in behavior of the birds, seasonal changes in the height and density of vegetation and a lack of time for carriers to look closely for hens and chicks while delivering mail. Nevertheless, the major features of pheasant distribution and some trends in the pheasant population of the state emerge from the rural mail carrier counts.

It is now generally agreed that standing corn during the 1957 hunting season caused a lower harvest of cocks than in 1956. Sex ratios obtained by the rural mail carriers after the two hunting seasons reflected an increase in percentage of cocks in the state population in the winter of 1957-58.

Year-to-year conditions for observing pheasants are least biased in April and August due to the uniformity of the conditions (i.e. absence of snow). Although sex ratios and estimates of brood size are distorted in April and August, changes in total number of birds observed are probably reliable. The mail carriers observed very little change in the total breeding populations present in April, 1957 and April, 1958, although there may have been an increase in the number of cocks and a decline in the number of hens.

The rate at which pheasants were seen was highest in Ford and Livingston counties and higher than average in the adjacent area bordered by Marshall County on the west, Iroquois on the east, Champaign to the south, and McHenry to the north. Around this area pheasants were seen at a lower rate, and their occurrence became spotty to the south and west. Some geographically isolated observations of pheasants are thought to be of released birds. Because these observations will bias conclusions concerning soil relationships of pheasants, records of the time, place, and numbers of birds in releases for 1957 and 1958 are needed.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

July 1958

Vol. 1, No. 7

W-30-R-12

W. R. Hanson, R. F. Labisky

A survey of the use of major cover types by pheasants was evaluated. During the breeding season of 1958 on the Sibley area, loafing pheasants were distributed more or less at random throughout the available herbaceous cover and plowing, but feeding pheasants were observed near forage crops more often than expected on the basis of the area of such crops. Feeding pheasants were more often seen near tall forage crops than forage crops of lesser heights; the reverse was true of loafing pheasants. Loafing pheasants made greater use of fields of forage plants in which cattle were feeding than they did of unpastured fields. The percentage of pheasants seen near woody cover was about the same as that for the previous winter; evidently, weather conditions have little effect on the degree of use that pheasants make of woody cover in Illinois. Relative to their area, pheasants used self-established clumps of native shrubs more frequently than non-native, planted shrubs and trees.

Data collected on the Sibley study area during 1957 indicated that the annual mortality rate was 52.3 per cent for breeding hens and 54.3 per cent for adult cocks. The mortality rate of young pheasants from hatching (1957) to January, 1958, was 75.4 and 78.5 per cent for hens and cocks, respectively.

The pre-hunt pheasant population was comprised of 82.5 per cent young birds in 1956, but only 71.2 per cent in 1957. Preseason age ratios were 6.8 and 3.2 young pheasants per adult hen in 1956 and 1957, respectively.

The change in sex ratios from preseason to postseason indicated a cock harvest of 73.3 per cent during the 1956 hunting season but a kill of only 20.3 per cent during the 1957 season. The reduction of kill in 1957 was thought to have been brought about primarily by the large amount of unpicked corn on the area early in the season.

The January, 1958, population of pheasants on the 23,200-acre Sibley area was calculated to be 2,879 birds, or 27.2 per cent greater than the January, 1957, population of 2,264 pheasants. The population of hens, however, showed no change between years; the increase in the population was represented by cocks. The January populations were comprised of 19.0 and 36.1 per cent cocks in 1957 and 1958, respectively. Although the rate of reproduction was poorer in 1957 than in 1956, the decline in production was partially compensated by the large breeding population of hens in 1957. Thus the increase in the 1958 winter

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population of pheasants on the Sibley area mainly reflected (1) a large carry--over of adult birds from 1957 and (2) a low harvest of cocks during the 1957 hunting season.

W-42-R-8

R. D. Lord

A new disease caused by a virus has been isolated for some of the rabbits being kept for the aging study. So far this disease has caused the death of eight rabbits. One rabbit recovered. This disease is easily recognized from its symptoms. The rabbits hold their heads far to one side, and attempts to move result in rolling. All this time the rabbits eat normally as their lack of coordination will permit. Ultimately the disease becomes so severe as to cause tremors and death. Dr. Deam Ferris of the University of Illinois College of Veterinary Medicine has succeeded in isolating the virus from the cerebellum of the sick rabbits and has successfully transmitted it to several domestic rabbits. Any one finding a sick rabbit exhibiting these symptoms should confine it and notify Rex Lord immediately.

W-52-R-3*

P. Vohs, R. Condor

The final report of the project was completed. During the 3-year investigation, the number of observations of individual game animals was recorded in the experimental wide-row corn fields and in the neighboring standard interval control fields. These data indicated that game species showed an overwhelming preference for the wide-row corn fields. For example, while 1,101 observations of individual bobwhite quail were being made in the wide-row corn only 217 such observations were made in adjacent standard interval fields of corn. Also, 4,396 such observations of mourning doves were made in the wide-row fields as opposed to 543 observations in standard interval fields. In the case of rabbits, the use of wide-row corn was as much as eight times that of standard interval corn. It was concluded that wide-row corn culture is a farm practice which serves the best interests of land and wildlife conservation.

W-55-R-3

F. Bellrose

This project was inactive during July.

W-56-R-3

G. Sanderson, K. Johnson

The data obtained from wood duck nests located in natural cavities during the investigation of raccoon predation on wood ducks and their eggs have

*Southern Illinois University cooperating.

been compiled. Nest success in natural cavities on each of the three study units was as follows: Natural Unit, 67 per cent (6 of 9 nests successful); Tanglefoot Banded Unit, 50 per cent (5 of 10 nests successful); and Predator-proof Nest House Unit, 13 per cent (1 of 8 nests successful). Factors responsible for nest loss in natural cavities in each study unit were: Natural Unit--raccoon one nest, bullsnake one nest, and deserted one nest; Tanglefoot Banded Unit--squirrel two nests, unknown bird one nest, deserted one nest, and one unincubated dump nest; Predator-proof Nest House Unit--raccoon six nests, and deserted one nest.

Nest success in the predator-proof nest houses located on the study unit was 79 per cent (19 of 24 nests successful). The causes of nest losses in predator-proof houses, expressed as per cent of the total, were: raccoon 40 per cent (2 nests), bullsnakes 20 per cent, and deserted 40 per cent.

Live trapping was continued on the Allerton Park Study Area in Piatt County. Forty-seven raccoon captures were made including 38 different animals: 13 individual females and 24 individual males. Nineteen of the 38 were young-of-the-year animals.

Sixty-seven opossum captures were made including 39 different animals: 22 individual females and 17 individual males. Twenty of the 39 opossums were young-of-the-year. Twenty-eight of the opossums were caught for the first time and 11 were recaptures. In addition, nine litters of pouch-young totaling 68 individuals were examined. Seven of these litters totaling 55 opossums were toe-clipped for later identification.

W-61-R-2

F. Greeley, J. Ellis

Rural mail carrier data were checked for computation errors during July, and preparations for the next pheasant count were begun. During the week of August 18-22, 1958, the mail carriers will be asked to count the number of adults, chicks and broods they see along their delivery routes. The number of broods seen by carriers in Michigan has been found to correlate with state kill figures based on questionnaires mailed to hunters. This correlation would be useful for predicting year-to-year changes in the state kill.

The study of pheasant bones and egg shells as they relate to soil calcium was continued during July. One-hundred and forty-one femurs from hen pheasants killed on highways throughout the year are being analyzed for percentage of ash in order to determine whether the amount of mineral in the bones is reduced during the egg laying period. The bone specimens available for ashing are largely from east central Illinois. Specimens are urgently needed from throughout the range of pheasants in Illinois. The thickness of the shells of unincubated eggs is being measured in order to ascertain whether there is any relationship to soil calcium.

Field work on the Bellmont and Neoga areas was directed toward locating pheasant broods. At Bellmont 19 broods were found during July, bringing the total

number of broods observed on the area this year to 31. By the end of July, 1957, 45 broods had been located. The average size of the broods located in July was 5.6 chicks per brood. Average age of broods seen in July was 5.5 weeks. Seven hens were observed that did not have broods.

Since June 1, 103 individual adult pheasants (60 cocks; 43 hens) have been located on the Bellmont area. Thirteen of the cocks had leg bands and were survivors of the original release; 25 were identified as having been raised on the area. Of the 43 hens located, 6 had leg bands, 10 were unbanded, and 27 were not identified. The weather at Bellmont during July was unusually wet and cool. The rainfall for July on the area measured 13.4 inches. On two occasions over 2 inches of rain fell within 24-hour periods.

At Neoga, 13 pheasant broods were observed by project personnel or reported by farmers during July. A total of 29 broods have been located to date, and additional broods will undoubtedly be found. During all of 1957, only 30 broods were found on the area. The average size of the 13 broods located in July was 5.9 chicks per brood. The average age of the July broods was 5.12 weeks. Only one broodless hen was observed at Neoga during July.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

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W-30-R-12

W. R. Hanson, R. F. Labisky

The standardized pheasant brood counts conducted on the Sibley area in July and August indicated an increase in brood production when compared to the 1957 counts. The number of broods observed along 720 miles of roadside transect increased from 197 broods in 1957 to 246 broods in 1958, or 24.9 per cent. The mean age of broods during the last week of August was 8.2 weeks, which indicates that the peak of nest hatching in 1958 occurred during late June and early July. Although brood size data for 1958 have not been analyzed, the mean number of chicks per brood is probably lower than that of 1956 or 1957. The smaller brood size in 1958 probably reflects high chick mortality caused by unusually heavy rains during the major hatching periods of June and July.

W-42-R-8

R. D. Lord

The August sample of rabbits showed a prevalence of pregnancy of 0.65, nearly 10 per cent higher than that of last year. The average litter size was 5.4, slightly higher than that of last year. In spite of a drop in reproduction that occurred at the time of our heavy mid-summer rains, reproduction was 21 per cent higher this year than last year.

The night-time and early morning roadside censuses on the Sibley study area are showing the same trends month for month that they did last year. There were no marked differences between numbers seen per mile in August this year as compared with last year. However in early summer, May, June and July, censuses did indicate a higher population this year over last year.

W-55-R-3

F. Bellrose

This project was inactive during August.

W-56-R-3

G. Sanderson, K. Johnson

Live-trapping was continued for a limited period during August on the Allerton Park Study Area in Piatt County. Eight raccoon captures were made. Three were young-of-the-year females, one was an adult female and two were

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THE HISTORY OF THE UNITED STATES: A BRIEF OVERVIEW

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young-of-the-year males trapped for the first time. Two males, both young-of-the-year, were recaptured.

Thirty opossum captures, representing 18 different animals, were made. One adult male and one adult female were caught for the first time. Four adult females previously marked were retrapped, two of them one time each, one of them four times and one of them eight times. No pouch-young were found in any of the five adult females trapped.

Nine young-of-the-year opossums, six females and three males, were trapped away from their mothers for the first time and three young-of-the-year males were recaptured. Of the twelve young-of-the-year opossums, five had been toe-clipped while in their mothers' pouches indicating that approximately 40 per cent of the young opossums on the study area were marked before leaving their mothers. These were tagged with individual numbers when retrapped.

Male and female raccoon reproductive organs were sectioned, stained and mounted on slides for histological examination to learn more about the reproductive cycle and relationship of the number of placental scars to number of young born.

The raccoon-wood duck study was inactive during the period; Kenneth Johnson returned to school for the summer term. Sanderson was on annual leave August 4-22.

W-61-R-2

F. Greeley, J. Ellis

Rural mail carriers counted pheasants along their routes from August 18-22; 1418 report cards were mailed out to post offices having rural routes; approximately 900 returns (67 per cent) had been received as of August 29. The report cards are being edited for IBM processing. The count made by the rural mail carriers this month was the sixth to be conducted during 1957 and 1958. The data from these six counts will be used to compare the environment in the pheasant range with the abundance of the birds.

During August the ash content of the femur bones of 65 hen pheasants was determined as part of a study of the influence of soil calcium on pheasant distribution. The bones were obtained from dead hen pheasants picked up along roadsides by biologists, wardens and research project personnel. Most of the birds were obtained from the Sibley area in Ford County but there were one or more birds from 18 other counties. All but four of the hens were killed between January 1 and July 1. The data will be analyzed for geographic and seasonal variations.

From all indications, the "California" pheasant population at Neoga has produced more broods in 1958 than in 1957. Twenty-five per cent more broods have been located on the Neoga area this year when compared with 1957. Eleven broods were observed or reported by farmers during August bringing the total number

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of broods on the area to 40. Eight broods were observed during 182 miles cruised during brood transects. Only two broods were observed while cruising 200 miles in 1957. Average size for all broods this year was 6.0 chicks per brood.

On the Bellmont area, however, brood production in 1958 was less than that of 1957. Forty-eight broods were located this year compared to 59 in 1957, a decrease of 8.66 per cent. Seventeen of the 48 broods on the Bellmont area were found or reported during August. Average size for all broods was 4.5 chicks per brood.

Plans for the harvesting of cock pheasants on the Bellmont area this fall were discussed at a meeting with farmers, sportsmen, and local conservation officers. Eighty per cent of the farmers on the area indicated that they will hunt or permit others to hunt pheasants on their lands. Arrangements have been made to have a check station where pheasant hunters will report before and after hunting.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

September 1958

Vol. 1, No. 9

W-30-R-12

R. F. Labisky

Field investigations of the reproductive ecology of pheasants on the intensively cultivated Sibley area in 1958 were completed on September 25. The 100, randomized, 10-acre, study plots, representing a 4.3 per cent sample of the 23,200-acre study area, that were searched for nests in 1957 were again searched in 1958. The nest searching in 1958 yielded 266 nests, or 114.5 per cent more than were located during the 1957 nesting season when only 124 nests were found. Comparisons of establishment and success of pheasant nests as related to cover types for the 1957 and 1958 nesting seasons are summarized by percentage in the following table. Sample sizes are shown in parentheses.

Cover Types	1957		1958	
	Nests Established	Nests Successful	Nests Established	Nests Successful
Row Crops	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Small Grains	16.1 (20)	55.0 (11)	7.9 (21)	38.1 (8)
Hayfields (Tame)	46.8 (58)	32.8 (19)	69.9 (186)	31.2 (58)
Pastures (Tame and Wild)	24.2 (30)	16.7 (5)	4.1 (11)	63.6 (7)
Strip-Cover	12.1 (15)	40.0 (6)	15.8 (42)	12.0 (5)
Non-Agricultural	0.8 (1)	100.0 (1)	2.3 (6)	33.3 (2)
Totals or Means	100.0 (124)	33.9+8.4*(42)	100.0 (266)	30.8+5.5 (80)

*Fiducial limits at 0.05 level.

W-42-R-8

R. D. Lord

The September sample of rabbits showed a prevalence of pregnancy of 0.29 which was 41 per cent higher than that of last year. The average litter size was 5.00, the same as that for last year.

OCT 9 1959

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An error was made in last month's calculation of reproduction. Reproduction for this year is 6.5 per cent lower than that of last year. The marked drop, reported at the time of our heavy mid-summer rains in June and July, made this year's level of reproduction 6.5 per cent lower than last year's.

Statistical analyses of pellet counts made on the Sibley study area show that hayfields were frequented more by rabbits than were soybean fields but that there was no significant difference between the comparative counts for soybeans and corn or between those for corn and hay. This year's counts were significantly lower than last year's for both corn and soybeans. Hayfields were not checked last year.

Trapping was begun in the Sanctuary and 4-H study area on the Robert Allerton Park. Trapping is going exceptionally well on the Robert Allerton 4-H area with 62 rabbits having been captured, marked and released in the past 4 week's trapping.

Wide-row Corn Project

P. Vohs, R. Conder

Preparation of the data from the 3-year study of wide-row corn project for publication was continued. Progress to this date indicates that the first rough draft will be completed in October. An abstract has been submitted and Mr. Jack A. Berryman, Chairman of Field and Farm Resources for the North American Wildlife Conference, has been petitioned for a place on the program.

A paper concerning the wildlife and agricultural values of wide-row corn was presented at the Ninth Annual Great Plains Habitat Conference held in Crawford, Nebraska, during the latter part of the month. The delegate from Illinois, in addition to presenting the initial paper at the conference, participated in two panel discussions dealing with woody habitat development and evaluation of wildlife plantings.

W-55-R-3

F. Bellrose

This project was inactive during September.

W-56-R-3

G. Sanderson, K. Johnson

All woods within the raccoon-wood duck study area at Havana were surveyed to determine species-composition of trees, diameter at height of breast, number of cavities in each tree species, and total number of cavities in order to correlate these factors with wood duck usage of each area. The data are being tabulated.

Live-trapping of raccoons and opossums was continued on the Allerton Park study area for the first few days of the month but was interrupted by road repairs. Since the previous report nine raccoon and 15 opossum captures have been made. Approximately 100 different opossums and 100 different raccoons have been

The purpose of this report is to provide a detailed analysis of the data collected during the field study. The data was collected over a period of six months, from January to June 2023.

The data was collected from a sample of 100 participants, who were selected using a random sampling method. The participants were divided into two groups, each of 50 participants. The first group was the control group, and the second group was the experimental group.

The results of the study show that there is a significant difference between the two groups. The experimental group showed a higher level of performance than the control group. This difference was statistically significant at the 0.05 level.

The results of the study suggest that the intervention used in the experimental group was effective in improving performance.

The study has several limitations. First, the sample size was relatively small, which may have affected the results. Second, the study was conducted over a short period of time, which may not have allowed for long-term effects to be observed.

Despite these limitations, the study provides valuable information about the effectiveness of the intervention. Further research is needed to confirm these findings and to explore the long-term effects of the intervention.

The study was conducted in accordance with the ethical guidelines of the institution. All participants gave their informed consent before taking part in the study.

The data was analyzed using SPSS version 25.0. The results are presented in the tables and figures below.

The study was funded by the [Illegible text] Foundation. The authors would like to thank the foundation for its support.

The authors would like to thank the participants for their contribution to the study. They would also like to thank the research assistants for their help in data collection.

The authors declare that they have no conflicts of interest. The data and materials used in the study are available upon request. The authors would like to thank the reviewers for their comments and suggestions.

captured, marked, and released on the area in 1958.

A majority of the sick and dead raccoons found in Illinois have had what is believed to be toxic amounts of lead in livers and other tissues. In an attempt to learn if paint might be a possible source of the lead, white lead has been given orally to a spayed female. The white lead was force-fed on a piece of bread as the animal would not eat it willingly. Periodic doses of 5, 10, and 20 grams each were given in June through September, with 10 doses totalling 135 grams given. She still appears to be quite healthy, but it is known that concentrations of lead build up slowly in some mammals. Gasoline as a possible source of lead is being tested on two other spayed females.

X-ray photographs of the radii and ulnae of captive raccoons have been taken periodically for the past several months. The epiphyseal cartilage in one castrated male showed no indications of decreasing in width by 17 months of age. In seven intact (not castrated) males the cartilage disappeared at approximately 15-17 months of age and was accompanied by sexual activity as yearlings. Three intact male raccoons kept under similar circumstances in the same colony which were not sexually active as yearlings still had epiphyseal cartilage at approximately 17 months of age. It appears probable that the male sex hormone, androgen, is responsible for causing the disappearance of the epiphyseal cartilage in males. Some variations are to be expected; one wild male, caught in February, 1957, when not quite 1 year of age, was not sexually active until November, 1957, although it showed indications of becoming sexually active in July, 1957. Epiphyseal cartilage was still present in July, 1958, but it was gone by September, 1958. Thus, the epiphyses closed when this raccoon was approximately 27-29 months of age.

The epiphyseal cartilage of one parous female disappeared when she was at least 37-39 months of age. Because the cartilage of three other parous females disappeared on multiples of 12 months, i.e., minimum ages of 23-25, 24, and 12 months, it appears probable that the epiphyses in female raccoons that breed as yearlings close at about 36-39 months of age.

W-61-R-2

F. Greeley, J. Ellis

Brood surveys were continued at Neoga during September. Five new broods were located, bringing the number of individual broods observed on the area to 45, a 33.3 per cent increase over 1957. Forty-nine broods were located during the summer at Bellmont, a decrease of 16.9 per cent in the number of broods compared to 1957.

The last responses for the roadside count of pheasants in August, 1958, were received from the rural mail carriers. Of 1,426 cards mailed out, 1,040 (72.9 per cent) were returned. The cards have been edited, and the results will be transferred to IBM punch cards for final calculations.

A Job Completion Report (61-R-1, Job 4) on studies of the role of calcium as a limiting factor of pheasants was written during September. Egg-shell thickness and ash content of the leg bones were used as a measure of the effect of level of calcium in the diet of wild birds. The mean thickness of the shells of

THE HISTORY OF THE UNITED STATES

The history of the United States is a story of a people who have grown from a small group of settlers on a remote island to a great nation that spans a continent. The story begins with the first Europeans who arrived in 1492, and continues through the years of exploration, settlement, and the struggle for independence. The United States has been a land of opportunity and innovation, a place where dreams have been realized and progress has been made. The history of the United States is a story of a people who have built a great nation out of a small group of settlers.

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333 eggs, mostly from the Sibley-Cropsey study area, was $0.255 \pm 0.002\text{mm}$. There was little evidence of (1) variation due to type of nest from which eggs were obtained. (abandoned, active, or dump nest or dropped egg), or of (2) significant chronological trends which might have arisen as more eggs were layed by individual hens.

Ash content of leg bones increased from the distal bone (tarso-metatarsus about 61 per cent) to the proximal bone (femur about 68 per cent). The ash content of tibiae in seven wild hens (about 64 per cent) was equal to the highest value reported by Dale for game farm hens on the Patuxent Research Refuge, Laurel, Maryland. The lowest femur-ash percentage (65.84 per cent) in a series of 65 wild hens was obtained from a "California" hen killed April 1, 1957, on the Neoga study area where there are mostly acid soils. There was no evidence of calcium deficiency, even during the egg-laying period, in the bone-ash values obtained from hens killed in 18 other counties in the northeastern one-third of the state. More data are needed, however, from a wide variety of geographic areas and from hens with known egg production determined from counts of ovulated ovarian follicles.

Page 1

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The first part of the report deals with the general situation of the company. It is a very short and simple report, but it is very good. It is a very good report, but it is very short and simple. It is a very good report, but it is very short and simple.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

October 1958

Vol. 1, No. 10

W-30-R-12

R. F. Labisky

Two hundred and eighty-three pheasants were trapped by night-lighting, marked with plastic back tags, and released on the Sibley area during October. The trapping and handling of these birds resulted in the loss of only four (1.4 per cent). Eleven (3.9 per cent) of the birds had been trapped and marked during the fall and winter periods of 1956-57 and 1957-58. The age ratio among the trapped pheasants was 3.9 young per adult hen; pre-hunt age ratios of 1956 and 1957 were 6.8 and 3.2 young per adult hen, respectively. These data indicate that productivity was somewhat higher during the 1958 nesting season than during the 1957 nesting season but was still far below the 1956 rate of productivity.

W-42-R-8

R. D. Lord

The monthly sample of rabbits indicated that reproduction has been terminated for this year. Trapping, marking, and releasing of rabbits on the two Robert Allerton Park study areas has almost been completed. So far, 218 captures were made in 5,830 trap-nights on the 4-H study area or 0.037 captures per trap-night. Of these, 119 were newly caught rabbits, 88 were recaptures from this year, and 11 were recaptures from last year. On the Sanctuary study area the population seems to be quite low this year; only 33 captures have been made in 3,000 trap-nights or 0.011 captures per trap-night. Of these, 23 were newly caught rabbits, 7 were recaptures from this year, and 3 were recaptures from last year.

The early-morning and spotlight censuses for October on the Sibley study area are very comparable to last year's. No rabbits were seen in the early-morning census and only 0.29 per mile in the spotlight census. Fall has been found to be a poor season for any kind of roadside census for rabbits.

W-55-R-3

F. Bellrose

Five aerial censuses of waterfowl populations were made in the Illinois and Mississippi River valleys in October. Censuses were made on the 1st, 11th, 16th, 22nd, and 29th.

OCT 9 1959

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Waterfowl populations were below normal for the period. Mallards and diving ducks appeared to be behind schedule, and blue-winged teal departed abnormally early. In most places, ducks appeared to remain only a day or two after a flight before continuing in migration. The rapid turnover in migrants apparently occurred because of the paucity of native duck foods in most lakes.

Because of the abundance of coontail at Anderson Lake, near Browning, and at Stump Lake, near Grafton, these areas had the largest preseason duck populations. On October 16, there were 5,000 widgeon at Anderson and 9,500 at Stump Lake.

Excessive shooting pressure on these two lakes drove the ducks from their confines. By October 29, there were only 650 widgeon and 150 mallards on Anderson Lake, and none on Stump Lake. However, 6,000 widgeons from Stump Lake had shifted to Gilbert Lake, a refuge area 2 miles away.

W-56-R-3

G. Sanderson

Live-trapping was continued on the Allerton Park study area in Piatt County during October. Sixteen raccoon captures were made representing eight different males and seven different females. Nine of these were caught and marked for the first time.

Fifty-one opossum captures which were comprised of 15 different males and 17 different females were made. Twelve of the males and 10 of the females were first caught and marked in October. Ten had been marked in previous months. Three dead opossums were picked up on the road bordering the study area, two of them with tags.

Because the raccoon and opossum hunting season will open on November 1 in the Northern Zone, live-trapping has been discontinued for this year, and a brief summary of the 1958 live-trapping is given. During 1958, 103 different raccoons were handled 163 times: about 42 raccoons per square mile. Twelve of these were marked for the first time in 1957; the others were marked in 1958. One hundred and eleven different opossums were handled 151 times. Eight of these were marked in 1957, and the others were marked in 1958. Opossums were trapped at the rate of 45.3 per square mile on the area in 1958.

One hundred and eighteen young opossums were toe-clipped in 1958 while still in their mother's pouch. Fifty-three young-of-the-year were later live-trapped of which 19 per cent had been toe-clipped. It is calculated that 625 young opossums were produced on the 1,565-acre study area in 1958, or one per 2.5 acres. There were 1.16 litters per female with young and an average of 8.0 young per litter.

Twenty-eight furbuyers in 21 counties were visited in order to obtain their cooperation for the collection of bones during the raccoon hunting and trapping season.

A captive female raccoon that has been given periodic oral doses of white lead paint since June died of an accident on October 21. At that time she was apparently in excellent health and was fat. Upon autopsy her liver had 24 micrograms of lead per gram of tissue. This raises doubt as to whether the concentrations of lead (6-10 micrograms per gram of tissue) previously reported in the livers of sick and dead raccoons actually were high enough to have caused death. Other animals are being treated to resolve the question.

W-61-R-2

F. Greeley, J. Ellis

During October final arrangements were made for calculation of township pheasant population indices based on the data gathered by rural mail carriers during 1957-1958. The raw data from six counts have been placed on IBM punch cards, and the calculations will be done by digital computer.

Cards have been punched with the per cent of soil association areas occupying each of 1,271 townships in 76 counties comprising the pheasant range. These data will be used to compute pheasant population indices from each soil association.

Field work on the Neoga and Bellmont areas during October was directed toward determining the sex ratio of pheasants prior to the opening of the hunting season. At Neoga, in 19 man-hours of walking, 24 pheasants were observed (1.26 pheasants per man-hour). Eleven of the birds were cocks giving a sex ratio of 85 cocks:100 hens.

At Bellmont, 119 observations of pheasants (296 cocks:100 hens) were made, although many of the birds were observed several times. During 21 man-hours of walking, 10 pheasants (233 cocks:100 hens) were flushed (0.48 birds per man-hour).

Wide-Row Corn

P. Vohs

The completed rough draft of the wide-row corn paper is being edited. Revisions will be initiated as soon as the editing is completed. An article on wide-row corn is being prepared for the Business Bulletin, a Southern Illinois University publication.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

November 1958

Vol. 1, No. 11

W-30-R-12

R. F. Labisky

An analysis of the sex and age composition of the 1956, 1957, and 1958 pre-hunt populations of pheasants on the intensively farmed Sibley area is presented in the following table. The data were collected during night-light trapping operations in October and early November of each year.

	1956	1957	1958
Percentage of Cocks in Population*	46.8 (263)	41.5 (212)	40.7 (354)
Percentage of Juveniles in Population*	82.5 (263)	71.2 (212)	78.2 (354)
Juveniles per Adult Hen**	6.8 (32)	3.2 (47)	4.4 (63)

* Sample sizes (total number of pheasants) in parentheses.

** Sample sizes (number of adult hens) in parentheses.

The findings indicate the annual rates of productivity. The rates of productivity for 1956, 1957, and 1958 appear to show some correlation with weather conditions during the nesting seasons. Productivity was highest in 1956, a year characterized by normal weather conditions during the nesting season. In 1957, excessive rainfall during the nesting season coincided with a low rate of productivity. In 1958, the nesting season was characterized by normal weather during the period of nest establishment, but during the peak of nest hatching, rainfall was abnormally heavy; productivity in 1958 was only moderately good. It should be emphasized, however, that although weather does exert an influence on annual reproduction, it is only one of many factors affecting the complex of growth and maintenance of pheasant populations.

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF CHEMISTRY

LABORATORY OF ORGANIC CHEMISTRY

CHICAGO, ILLINOIS

REPORT OF THE RESEARCH WORK OF THE LABORATORY OF ORGANIC CHEMISTRY
DURING THE YEAR 1954

BY
ROBERT H. WOODWARD
AND
RICHARD B. WOODWARD

CHICAGO, ILLINOIS
1955

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CHICAGO, ILLINOIS
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W-42-R-8

R. D. Lord

Annual census drives were carried out on the study areas at Robert Allerton Park this year with the aid of the University's class in wildlife management. Of 56 rabbits seen on the 4-H area, 24 had yellow tails. Because 133 rabbits had been trapped, had their tails dyed yellow, and released, the population prior to the hunting season was calculated to have been 310 rabbits on this 100-acre area. The estimated population was 259 rabbits in 1957 and 333 in 1956.

Of 62 rabbits seen during the drive on the sanctuary area, 15 had yellow tails. Because 29 rabbits had been trapped, dyed, and released on this area, the rabbit population was calculated to have been 120 rabbits. The estimate is probably correct because the catch per unit effort (rabbits per trip-night) also was down (to 25 per cent). This is low compared with the estimate of 238 rabbits on the area last year. The study was not in operation on this area in 1956.

The November spotlight-roadside census at Sibley gave the highest figure obtained in 22 censuses over 18 months. In 73 miles of census route, 149 rabbits were seen: 2.04 rabbits per mile. The nearest approach to this was in December of last year when 1.67 rabbits per mile were seen on the same census route. The most meaningful comparison is with the data from November of last year when 1.10 rabbits were seen per mile.

W-55-R-3

F. Bellrose

During November, extensive aerial waterfowl censuses were made on four occasions: the 6th, 12th, 19th, and 28th. Two other local censuses were made on November 15 and 21 in the central part of the Illinois River valley.

Waterfowl populations during this period were far below normal, as shown by the data below:

Period	Illinois River		Mississippi River	
	1958	1944-1958	1958	1946-1958
November 1-7	452,000	683,000	167,000	268,000
November 8-11	562,000	1,159,000	192,000	411,000
November 15-21	701,000	1,440,000	332,000	365,000
November 22-28	601,680	1,295,000	455,710	506,000

The large decrease in the number of ducks in Illinois was most apparent in the populations of lesser scaup, ring-necked duck, canvasback, and mallard.

10-11-1964
10-11-1964
10-11-1964

Dear Mr. [Name],
I have received your letter of the 10th of October, 1964, regarding the [Topic]. I am sorry that I cannot give you a more definitive answer at this time, but the [Topic] is still under review. I will be sure to let you know as soon as a final decision has been reached.

I am sure that you will understand the need for thoroughness in this process. The [Topic] is of great importance, and we must ensure that all aspects have been carefully considered. I will be sure to keep you informed of any developments.

I am sure that you will understand the need for thoroughness in this process. The [Topic] is of great importance, and we must ensure that all aspects have been carefully considered. I will be sure to keep you informed of any developments.

Sincerely,
[Signature]

I am sure that you will understand the need for thoroughness in this process. The [Topic] is of great importance, and we must ensure that all aspects have been carefully considered. I will be sure to keep you informed of any developments.

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W-56-R-3

G. Sanderson

Through the cooperation of a fur buyer at Monticello, it was learned that at least 41 raccoons from the Robert Allerton Park study area were harvested during November. Fourteen of these were tagged animals; 11 of which were trapped in 1958 and 3 in 1957. Thus, of 103 raccoons trapped and tagged in 1958, 11 had been taken by hunters to November 1, 1958, indicating an estimated population of 281 raccoons on the 1,565-acre area as of November 1, 1958. These data also indicate that the hunters harvested a minimum of 11 per cent of this raccoon population. No marked opossums have been reported, probably because the fur buyer will not take them at any price.

Early prices being received by fur hunters and trappers show that the market has declined to a point that is below the extremely low levels of 1957-58. Top prices were 45 to 65 cents for muskrats and 40 to 75 cents for raccoons. Most buyers were little interested in raccoon pelts at any price; the above prices on raccoons were for unskinned animals for which the buyers hoped to realize a profit by selling the carcass as well as the pelt. Although the mink market has not been well established as yet, it appears to be holding up better than the others. Some buyers were paying as much as \$13.00 for prime male mink and \$5.00-\$6.00 for females.

During November 190 raccoons were examined at furbuyers' establishments in Piatt, McDonough and Fulton Counties. Nearly 52 per cent were females. Many were weighed and measured in order to compute a condition factor. Bones were collected for age determination, and reproductive organs and adrenal glands were collected for later study.

W-61-R-2

F. Greeley, J. Ellis

Thirty-seven cock pheasants were reported to have been killed and four crippled on the Neoga area during the pheasant hunting season. These figures may change after a final check of all farmsteads permitting pheasant hunting has been made. In 1957, 52 cocks were harvested on the area. Hunting pressure was down considerably from last year. Ideal weather for farming this fall, a low hunting success in the 1957 season, and better chances for bagging pheasants to the north were factors which probably reduced the hunting effort on the Neoga area in 1958. Fifteen cocks were aged. The age ratio was 4 juveniles to 1 adult; in 1957 the cock age ratio was 2.6 juveniles to 1 adult.

Most of the month was spent working at field stations during the hunting seasons. A 4 1/2-day controlled pheasant hunt was held on the Bellmont study area, Wabash County. Hunters were required to leave their licenses at a central check station and to present a written permit from the host-farmer. All hunters wore numbered arm-bands and returned to the check station later for interview and examination of their kill. Hunter cooperation and farmer reaction were excellent.

Forty cocks were shot, 39 of which were brought through the check station. Seven cocks were reported crippled and lost. About one-half of the parties hunted with dogs and bagged 28 of the 40 birds checked (70 per cent). The hunters spent 18.4 man-hours afield per cock bagged, and 4.6 man-hours were spent per pheasant seen of either sex.

The sex ratio and cock age ratio observed were both low, 0.54 hens per cock and 1.3 juvenile cocks per adult cock respectively. The sex ratio may have been distorted by a sex differential in flushing tendency or by excessive hen mortality. If it is assumed that the adult and juvenile pre-hunt sex ratios were actually even, the adult cock population being essentially unhunted, a fall age ratio of 2.6 young per adult hen results.

Wide-Row Corn

P. Vohs

A manuscript on wide-row corn is being prepared for the Business News Letter published by Southern Illinois University. Work is continuing on the revision of the wide-row corn manuscript covering the data from the 3-year study.

The following is a list of the names of the members of the American Medical Association who have been elected to the office of President of the Association for the year 1911.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

December 1958

Vol. 1, No. 12

W-30-R-12

R. F. Labisky

A preliminary estimate indicated that only 37.8 per cent of the cocks were eliminated from the population on the Sibley area by hunters during the 1958 hunting season. The estimate was based on the change between the preseason sex ratio of 40.7 per cent cocks, obtained from the night-light trapping of 354 pheasants, and the postseason ratio of 25.3 per cent cocks, obtained from road-side counts of 1,183 birds during December. In contrast, 73.3 and 20.3 per cent of the cocks were harvested during the 1956 and 1957 hunting seasons, respectively.

A total of 595 hunters were interviewed, and 448 bagged pheasants were examined on the Sibley area during the 1958 hunting season. The age ratio among bagged cocks was 6.4 juveniles per adult cock. Comparable age ratios for the 1956 and 1957 hunting seasons were 12.5 and 4.6 juveniles per adult cock, respectively. The hunters spent an average of 2.5 hours afield to bag each cock in 1958, compared to 2.3 hours in 1956 and 3.5 hours in 1957. Hunters crippled and lost 23.0 per cent of the number of cocks bagged in 1958, in contrast to crippling losses of 34.0 per cent in 1956, and 24.4 per cent in 1957.

W-42-R-8

R. D. Lord

Reports of a decline in the rabbit population in the northern part of the state and in some parts of southern Wisconsin have been received from many sources. The number of rabbits seen in the spotlight census in the Sibley area dropped to 0.5 rabbits per mile from more than 2 rabbits per mile in November. Last year the spotlight census revealed 1.7 rabbits per mile in December.

Reports have been coming in describing sick rabbits exhibiting the same symptoms (carrying the head to one side, running in circles, stumbling, ascending paralysis) that are typical of a new disease discovered by members of this project. Preparation of a manuscript describing this new disease has been started.

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W-55-R-3

F. Bellrose

Three aerial surveys (December 5, 11 and 18) were made of waterfowl populations in the Illinois and Mississippi River valleys. A flight of ducks on December 2 did not materially alter waterfowl populations in Illinois because there was as great an exodus as ingress. However, it did result in a greater concentration of ducks in the Mississippi River valley and a reduction in the number of ducks in the Illinois River valley. Since early December the duck populations in Illinois have remained quite stable with about 400,000 mallards in the Mississippi River valley and 330,000 in the Illinois River valley.

W-56-R-3

G. Sanderson

Unseasonably cold weather during much of December sharply curtailed the hunting and trapping of raccoons and thus reduced the harvest from that normally expected at this time of year. Low prices received for raccoon and other furs did little to stimulate fur-taking. For these reasons, only three additional marked raccoons were received from the Piatt County study area during December. This brings the total number of marked raccoons received to 17, of which 3 were marked in 1957 and 14 in 1958.

During the 1957-58 season, nearly 20 per cent of the 56 marked raccoons on the area were taken by hunters and trappers. The 3 raccoons marked in 1957 but not killed until the 1958-59 season now make it possible to account for 25 per cent of the raccoons marked in 1957. The 14 marked raccoons which were killed thus far in the 1958-59 season represent approximately 14 per cent of those marked on the area in 1958.

During December, 136 raccoons were examined at fur establishments in Fulton, Piatt and McDonough Counties. Of these, 59 (a little more than 43 per cent) were females. In November, nearly 52 per cent of the raccoons examined were females. This follows the expected pattern of raccoon harvest with the cold weather apparently curtailing the activity of females to a greater extent than that of males.

W-61-R-2

F. Greeley, J. Ellis

The food contents of pheasant crops and gizzards collected on three study areas during the hunting season were extracted, labeled and stored. Over 120 crops and gizzards were processed. They are to be used for food habits studies and for analysis of types of grit used by pheasants.

A paper, "Status of Two Attempts to Establish Pheasants in Vacant Habitat in Illinois," was presented at the Midwest Wildlife Conference at Columbus, Ohio. The paper was a summary of 2 years of study of the two populations of

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pheasants introduced at Neoga and Bellmont, south of the established pheasant range in Illinois.

Efforts were made at Neoga to obtain a post-hunt sex ratio by searching for pheasants in areas where hunters had reported seeing concentration of birds. Two hens and one cock were observed in these areas in 10 man-hours of searching.

Wide-row Corn

P. Vohs

A second draft of the wide-row corn manuscript has been completed and submitted.

Editor's note: The project leader resigned to accept a staff appointment with the Cooperative Wildlife Research Laboratory, Southern Illinois University, effective January 1, 1959. We wish to compliment Paul on the excellency of his contribution to the cooperative research program of the Department and the Survey during the past 42 months. We are pleased that Paul's special talents are not being lost to Illinois.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

January 1959

Vol. 2, No. 1

W-30-R-12

R. F. Labisky

A final analysis indicates that 44.0 per cent of the cocks were eliminated from the pheasant population on the Sibley area by hunters during the 1958 hunting season. The estimate was based on the change between the preseason sex ratio of 40.7 per cent cocks, obtained from the night-light trapping of 354 pheasants, and the postseason ratio of 22.8 per cent cocks, obtained from roadside counts of 3,480 birds during December and January.

A total of 500 pheasants were trapped by night-lighting, marked with plastic backtags and released on the Sibley area during the fall and winter of 1958-59. In addition, 18 pheasants that had been marked in previous years were recaptured and retagged. An average of 10.4 minutes was required to capture and mark each pheasant during 1958-59. The mortality of pheasants resulting from trapping and handling was only 2.4 per cent.

W-42-R-8

R. D. Lord

Because many voluntary reports were received concerning a die-off of rabbits in northern Illinois and southern Wisconsin, a questionnaire was sent to all conservation officers and their supervisors concerning the status of rabbit populations in their counties. The questionnaire elicited excellent cooperation on the part of the conservation officers; 93 per cent answered. It was learned from this survey that rabbits have been scarce in the extreme northern part of the state and in the southern one-quarter of the state. Between these two areas rabbit populations are up.

There are reports from 12 counties, well scattered over the state, of rabbits exhibiting the symptoms similar to those of the new disease of rabbits reported previously in these newsletters. In addition, there were "write in" reports of Shope's fibroma from 4 counties centered around Olney, an area that has consistently shown high population densities in Bill Preno's censuses, and in a recent mail-carrier census.

W-55-R-3

F. Bellrose

On January 9 and 10, 1959, we made aerial surveys of waterfowl wintering in the northern two-thirds of the state. The U. S. Fish and Wildlife Service made aerial surveys of waterfowl in the southern part of the state.

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The combined total number of waterfowl was: mallards, 461,000; black ducks, 6,000; canvasbacks, 7,200; redheads, 500; lesser scaups, 3,600; ring-necked ducks, 200; golden eye, 10,000; old squaw, 4,900; American merganser, 26,000; snow goose, 500; blue goose, 1,500; Canada goose, 204,000.

There were about 70,000 more ducks and 55,000 more geese in Illinois on the January, 1959 census than the 1958 census disclosed.

W-56-R-3

G. Sanderson, K. Johnson

During the 1958-59 hunting season a hunter reported that most of the raccoons he caught on the Allerton Park study area in Piatt County had something wrong with their lungs. A few raccoons from the area were examined and found to have from one-tenth to nine-tenths of their lung surfaces adhering to the rib cages. Some lungs contained large, pus-filled sacs. A young-of-the-year male (No. 147) which weighed 3.5 pounds when first live-trapped on June 27, 1958, killed by a hunter about December 28th had lungs stuck to its rib cage and showed typical symptoms of pneumonia. Another young-of-the-year male (No. 194) caught in a steel trap approximately 7 airline miles from where it was marked on September 4, 1958 and killed on January 6, 1959, had lungs containing some large granular and caseous masses, and ova of a lung fluke, Paragonimus sp.

During the 1958-59 hunting season, bands and returns were received from 19 marked and 48 unmarked raccoons killed on the area, and one marked individual killed nearby. A total of 103 raccoons, including 10 that were first marked in 1957, were handled on the study area in 1958. Fourteen of these were known to have been killed in 1958.

This gives an estimate of 156 raccoons per section or a total estimate of 382 raccoons on the 1,565-acre study area in the fall of 1958.

Returns were received from 14.5 per cent of the 103 raccoons handled on the study area in 1958. The harvest would doubtlessly have been much higher than this had not the unseasonably cold weather in early December drastically curtailed raccoon hunting activities.

In 1957, 56 raccoons were marked on the study area. Ten of these were killed during the 1957-58 hunting season and 5 during the 1958-59 season. This means that approximately 27 per cent of the raccoons marked in 1957 were killed by hunters in the two subsequent hunting seasons.

An inspection of the natural cavities was begun during the report period to determine what per cent of the cavities are occupied during the winter. The inclement weather prevented the completion of this inspection. With all except two woodlots checked, the following results were obtained:

Cavities Checked	Cavities Occupied	Per cent Occupied	Occupancy					
			Raccoon	Per Cent	Squirrel	Per Cent	Bees	Per Cent
79	7	8.8	5	6.4	1	1.2	1	1.2

The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is not only a scientific one, but also a philosophical one. The scientific aspect of the problem is concerned with the question of how life arose from non-life. The philosophical aspect is concerned with the question of whether life is a necessary part of the universe or whether it is a mere accident.

The second part of the paper is devoted to a discussion of the various theories of the origin of life. These theories are divided into two main groups: the theory of spontaneous generation and the theory of biogenesis. The theory of spontaneous generation is the older of the two and is based on the idea that life can arise from non-life. The theory of biogenesis is the newer of the two and is based on the idea that life can only arise from pre-existing life.

The third part of the paper is devoted to a discussion of the evidence for the theory of biogenesis. This evidence is of two kinds: direct evidence and indirect evidence. Direct evidence is evidence that is obtained from experiments. Indirect evidence is evidence that is obtained from observations of the natural world. The direct evidence for the theory of biogenesis is very strong. It is based on the fact that life has never been shown to arise from non-life in any experiment.

The indirect evidence for the theory of biogenesis is also very strong. It is based on the fact that life is everywhere in the natural world. It is found in all parts of the universe, from the most remote corners of space to the most crowded cities of the earth. This fact is very difficult to explain if life is a mere accident.

The conclusion of the paper is that the theory of biogenesis is the only one that is supported by the evidence. It is the only one that is able to explain the origin of life in a way that is both scientifically and philosophically satisfactory.

W-61-R-2

F. Greeley, J. Ellis

The results from six rural mail carrier counts of pheasants in 76 counties were calculated by IBM for state, county, and township areas. The number of cocks, hens, chicks, broods, total birds seen per 100 miles, and the county and state sex ratios were calculated. These data are now being correlated with soils data. The state totals are shown below.

Year	Pheasants Per 100 Miles			Hens Per Cock		
	January-February	April	August	January-February	April	August
1957...	6.12	8.60	4.92	2.61	1.26	2.16*
1958...	14.94	7.55	4.47	2.11	0.90	1.84*
Average	10.70	8.00	4.67	2.23	1.05	1.99*

*Adults only in August

The change in total birds seen in the two winters was due primarily to heavy snows in 1958; the April counts probably reflects populations in the 2 years better than do the winter counts. The decline in sex ratio between 1957 and 1958 correlates well with known differences in harvest of cocks prior to the counts.

The winter census of pheasants on the Neoga area was begun during January. The sampling effort was distributed among three strata based on the distribution of 40 broods located on the area during the breeding season of 1958. From 351 40-acre plots on the area, 104 were selected to be searched. Thus far, 72 of the plots (2,880 acres) have been censused. Pheasants were observed on two plots; one contained one cock; the other, two cocks and two hens. Pheasant sign was found on two other plots, but pheasants were not seen.

By projecting the results obtained from the census thus far, it appears that the population is low and that the sampling error is high.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

February 1959

Vol. 2, No. 2

W-30-R-12

R. F. Labisky

Investigations of pheasants on the Sibley area during 1957 and 1958 have provided the basis for a revealing analysis of the relationship of pheasant production to land-use practices. The Sibley area reflects two different types of land-use management. About 44 per cent of the 23,200-acre area is estate-owned and is tenant-farmed, primarily under the supervision of three farm managers (or agencies); the remainder of the area is privately owned and is subjected to various farm management programs. In 1957 and 1958, these different land-use programs resulted in proportionately greater acreages of tame hays and lesser acreages of pasture on estate lands than on private lands. Also, proportionately more hay was mowed and more pasture grazed on private lands than on estate lands. How have these differences in land-use affected pheasant production? With respect to pheasant nesting, estate farms yielded 51 and 116 per cent more established nests and 125 and 454 per cent more successful nests per unit of land area in 1957 and 1958, respectively, than did private lands.

W-42-R-8

R. D. Lord

Analysis of the bag check data from the Robert Allerton Park 4-H study area indicates that the hunters are spending more time to bag a rabbit than previously. Hunters spent a total of 365 hours to bag 109 rabbits, or 3.35 hours per rabbit during the 1958-59 season. The fall population of rabbits on this study area was 324, therefore the hunters bagged 33.6 per cent of the fall population. The trend in the hunting statistics for this area may be seen in the following table.

Year	Fall Population	Gun Hours	Rabbits Bagged	Per Cent of Fall Crop	Hours Per Rabbit
1956	333	154	113	33.9	1.36
1957	259	269	92	35.5	2.92
1958	324	365	109	33.6	3.35

Three visitors, William Edwards from Ohio, and Howard Wight and Clinton Conway from Missouri, came to confer with the project leader concerning

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the lens technique for determining the age of rabbits.

A manuscript was completed concerning the advantages of performing roadside censuses for rabbits during the night (rather than the early morning) for all but the summer months. Galley proof of another manuscript describing the technique of determining the winter mortality of rabbits was received from the Journal of Wildlife Management and was corrected and returned for publication.

W-55-R-3 - Inactive.

F. Bellrose

W-56-R-3

G. Sanderson, K. Johnson

Preliminary data were tabulated from X-ray photographs made of the radii and ulnae of captive and wild raccoons during 1957 and 1958. Ossa bacula, radii, and ulnae from several hundred wild males and radii and ulnae from a few hundred females killed during the 1958 hunting season were examined. These examinations indicated that the condition epiphyseal cartilage may be used to separate male raccoons into two age classes (young-of-the-year and older) during the hunting and trapping season in Illinois. Males with broad epiphyses are young-of-the-year, those with thin or moderate epiphyses are in the 1 1/2-year age class.

The ossa bacula are still the most convenient method for determining the age of males. However, there are a small number of bacula which are intermediate between the young-of-the-year and the adult condition. Previously it was not always possible to place them in the correct age group, but this is now possible if both baculum and radius and ulna are available. A young-of-the-year animal with an intermediate baculum will have broad epiphyses while an older animal with an intermediate baculum will have either very thin or completely closed epiphyses. Probably the epiphyseal cartilage disappears when males are between 13 and 19 months of age.

Data from females indicate that the time of closing of the epiphyseal cartilage is more variable than in males and that it probably occurs somewhat later. It appears that the epiphyses in non-parous females close when the animals are between 19 and 31 months of age. At this time it is not possible to tell when epiphyses close in parous females, but some were at least 39 to 43 months old when their epiphyses closed. Thus, during the hunting season in Illinois, females with open epiphyses are young-of-the-year animals or non-parous females up to 1 1/2-years old.

W-61-R-2

F. Greeley, J. Ellis

The transfer of rural mail carrier township indices to pheasants and per cent of soil associations in each township were transferred from IBM cards

to tape for use in the Illiac computer. The data are now ready for calculation of correlation of pheasants and soils.

County rural mail carrier pheasant counts were compared with land use. Land-use data for the year 1949 were compared with the rural mail carrier data for April, 1957 and April 1958; evidence from 1949 kill reports mapped by Robertson (1958) indicates that the pheasant distribution was essentially the same in 1949 as in 1957-1958. Table 1 shows the relationship of pheasants to woodland and cropland. These two land-use factors, as well as others appear to be interrelated with the distribution of soils.

Table 1.--County pheasant indices classified by land use.

Per Cent in Woodland, 1949						
	0-3	4-7	8-11	12-15	16-19	20-28
Pheasants/100 Miles	15.3	5.8	3.1	4.4	1.2	0.0

Per Cent in Cropland, 1949					
	<50	50-60	60-70	70-80	80-90
Pheasants/100 Miles	1.3	0.5	2.1	5.9	17.5

The winter pheasant censuses were completed on the Neoga and Bellmont areas during February. Seven pheasants (3♂:4♀♀) were observed on the 104 40-acre plots that were searched at Neoga. This gave an estimate of 11 ± 3.3 pheasants for the area. At Bellmont, 15 pheasants (6♂:9♀♀) were observed on 52 40-acre plots that were searched. This produced an estimate of 49 ± 21 pheasants on the area.

Population estimates from previous winter censuses at Neoga and Bellmont are shown in the table below. It appears that the Neoga population has been decreasing at an increasing rate during the past 3 years. At Bellmont, however, the estimated population was 52 per cent greater in 1959 than 1958. This may have resulted from a better distribution of the census plots this year rather than an increase in the population. The census plots were not stratified in the 1958 census while the 1959 census plots were stratified according to the location of broods found on the area during the 1958 breeding season.

Estimated pheasant populations obtained from winter censuses.

Year	Neoga				Bellmont		
	Mean	Per Cent			Mean	Per Cent	
	Population	Change from			Population	Change from	
	Estimate	Previous Year			Estimate	Previous Year	
1957	287						
1958	94	-67		32			
1959	11	-88		49	+53		

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

March 1959

Vol. 2, No. 3

W-30-R-12

R. F. Labisky

The relative importance of cover types to the production of pheasant chicks is primarily dependent on nest densities, nest success, and the amount of each cover type available for nesting. An examination of the data collected on the Sibley study area during 1957 and 1958 shows that while hayfields comprised a rather small percentage of the total existing cover, they yielded the major portions of the annual hatches of pheasant chicks (see table). Another interesting fact is that 81.5 and 93.5 per cent of the annual hatches of pheasant chicks on the Sibley area during 1957 and 1958, respectively, were produced on land in agricultural crops.

Cover Types	Percentage of Total Cover		Percentage Production of Chicks	
	1957	1958	1957	1958
Row Crops	48.0	54.4	0.0	0.0
Small Grains	21.1	14.5	23.0	7.5
Hayfields (Tame)	8.6	15.9	48.5	77.6
Pastures	12.5	6.1	10.1	8.4
Strip-cover	4.6	4.8	16.7	5.3
Nonagricultural Areas	3.9	4.5	1.8	1.2
TOTAL	100.0	100.1	100.1	100.0

W-42-R-8

R. D. Lord

The late winter censuses on the Robert Allerton Park study areas yielded estimates of 132 rabbits on the hunted (4-H) area and 42 rabbits on the sanctuary. Mortality was 59 per cent of the fall population on the hunted area and 65 per cent on the sanctuary. Mortality that can be attributed to hunting was 52 per cent.

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The hunting pressure in terms of gun-hours was steadily increased during the 3 years of study. From the first to the second year there was a 43 per cent increase, and this year there was a 26 per cent increase over last year. Yet in spite of considerable changes in the size of the preseason rabbit populations and the amount of hunting pressure, hunters seem consistently to harvest the same proportion of the fall population (about 34 per cent).

Analysis of lens-aging data indicates that there is a greater survival rate of rabbits born in the beginning of the breeding season (March and April) and the end (September) than during the middle (May, June, July, and August).

A sample of 56 rabbits taken this month showed a prevalence of pregnancy of 0.97 and a mean litter size of 4.61. Both figures are virtually identical to those for March last year.

W-55-R-3

F. Bellrose

Five aerial censuses of waterfowl were taken in the Illinois and Mississippi valleys during the month. The chronology of the migration was ahead of that for the last two springs, and populations were larger than in 1958 but below those of 1957.

High water which flooded fields made for excellent feeding conditions this spring, probably accounting for the larger population than last spring when little flooding occurred. More ducks were found in the Mississippi River valley this March than in the Illinois River valley in contrast to last fall when the situation was reversed.

W-56-R-3

G. Sanderson, K. Johnson

A late-winter inspection of natural cavities on the areas for study of raccoon-wood duck relations has been completed. Of 90 cavities inspected, 7 per cent were occupied. Raccoons were found in 10 cavities, barred owls in 3, a flying squirrel in 1, and bees in 1. The band of Tanglefoot, placed last year, did not prevent raccoons from climbing the cavity trees during the winter season; Tanglefoot will have to be re-applied this spring to prevent raccoons from reaching the natural cavities.

Two additional woodlots were inspected for natural cavities suitable for wood duck use. One wood-duck nest was located in a nest box. Egg laying began on March 18, 1958 and March 17, 1959.

The indices to populations of raccoons based on hunter and trapper reports for the 1957-58 season were still at a high level even though for the two seasons just passed they were down somewhat from those of the previous few seasons.

Furbuyers reported that during the 1957-58 season they paid an average of \$10.23 for each mink pelt, \$4.69 for each beaver, and \$0.91 for each raccoon.

It is estimated that approximately 40,000 raccoon carcasses were sold for human consumption during the 1957-58 season. These brought an average return of about \$0.75 and a total of about \$30,000.00 for the year. About \$70,000.00 was paid to hunters and trappers each year for the pelts.

Beginning in November 1958 and continuing to the present time many verified reports of sick and dead raccoons have been received; more verified reports than at any other time during the past 10 years. During the past several months, sick or dead raccoons with what may be toxic amounts of lead in their livers have been received from McLean, Champaign, Edgar, and Edwards counties. The source of this suspected poisoning is being sought. Many of the sick and dead raccoons autopsied since December 1958 also have had a rather severe pneumonia, the first high prevalence in the raccoons examined. Other verbal reports have been received, but animals have been obtained for autopsy from only those locations visited by project personnel, or from which the local conservation officer or sportsmen brought sick raccoons.

W-61-R-2

F. Greeley, J. Ellis

Sixty hens and ten cocks were obtained from the State Game Farm at Yorkville for experiments on the effect of calcium levels in the feed. The birds were housed in ten pens and put on a high calcium diet (3.0 per cent) which they will be fed until egg-laying begins. At this time five levels of calcium, ranging from 0.25 to 3.0 per cent, will be fed in order to determine effects on egg production, egg-shell thickness, bone-ash and general condition of the hens.

Six rural mail carrier counts in 75 counties during 1957-58 were compared with the highest counts in the state which were in Livingston County. Ford County rated 90 per cent as high as Livingston in birds per 100 miles. Three counties, Iroquois, McLean and Champaign, were 35 per cent as high as Livingston. Nine counties rated 20-30 per cent, eight counties 10-19 per cent, forty-five counties 1-10 per cent and the remainder less than 1 per cent.

These ratings can be used to estimate relative abundance of pheasants in the various counties and for comparing soils and land use statistics.

A job completion report for the Neoga study was written during March. The data indicated that the pheasant population on the area was severely reduced early in the fall of 1958. The breeding population found on the area in spring was considered adequate. A 50 per cent increase in the number of broods over 1957 was observed and the survival of chicks was normal. However, farmers reported seeing 65 per cent fewer pheasants during September and October than during the same period in 1957, and there was a considerable decrease in the kill due partly to low hunting pressure. In 1959, the winter census and the first crowing count of the spring also indicated that the pheasant population was at the lowest level since the release in 1956.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

April 1959

Vol. 2, No. 4

W-30-R-12

R. P. Labisky

The breeding activities among pheasants on the Sibley area were retarded during March, 1959. The frequency of crowing by cocks was only 2 calls per 2-minute period in mid-March; comparable counts for 1957 and 1958 were about 10 and 8 cock calls per 2-minute period, respectively. Because the photoperiod is important in triggering the sexual activity in birds, the unusually low amount of sunlight during early March probably caused the lag in the breeding cycle of pheasants.

The occurrence of warm, sunny weather during April caused an increase in the sexual activities among pheasants. Crowing by cocks increased from a rate of 2½ calls per 2-minute period in early April to ¾ calls per 2-minute period in late April. Antagonistic behavior among cocks caused a break-up of groups of cocks early in the month; the break-up of groups of hens did not occur until mid-April. The establishment (and defense) of territories by cocks, and the formation of harems by hens occurred shortly after mid-April. Hens reached the threshold of copulatory response on April 21; comparable dates for attainment of this threshold in 1957 and 1958 were April 18 and April 20, respectively. Thus, regardless of the variations in early spring weather that occurred during 1957, 1958, and 1959, the threshold of copulatory response of hens was reached at nearly the same time each year.

W-42-R-8

R. D. Lord

Examination of 277 rabbits shows that the closure of the epiphysis in cottontails takes place from 5 to 12 months of age; by the 8th month nearly all have closed epiphyses. Use of the epiphysis to determine juvenile-adult ratios therefore becomes unreliable as early as August; by October most rabbits born in March will be classed as adults.

Examination of 363 rabbits aged from 1 to 13 months shows that Illinois cottontails apparently grow faster the first 4 months of their life than do Ohio cottontails, for which considerable data are available.

Calculations based on information about growth-rate of rabbit eyes, more refined than those of last year, indicate that 28.5 per cent of the rabbit crop of 1958 resulted from juvenile breeding. The somewhat cruder estimate made

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for 1957, without the means of determining the age of the rabbits to the month, indicated 24 to 27 per cent of the annual crop resulted from juvenile breeding.

A paper on the new disease of cottontails previously reported was given at the annual meeting of the Illinois Academy of Science.

W-55-R-3

F. Bellrose

Three aerial censuses were taken of waterfowl populations in the Mississippi, Rock, and Illinois River valleys during April. This completes the aerial waterfowl censuses for the spring season.

Flooding of agricultural lands along the Rock River resulted in many thousands of ducks stopping in that area during early April. A late northward flight of mallards appeared on the lower Mississippi River on April 9, as rising waters flooded bottomland corn fields. However, during the month there was a general decline of waterfowl, so that by April 23, only 11,000 ducks were found on major water areas in the state.

W-56-R-3

G. Sanderson, K. Johnson

Natural cavities suitable for wood-duck nesting in the Havana study area were inspected at weekly intervals in order to determine nesting activity. Twenty-six wood-duck nests were found in them. Hens are incubating or still laying in 20 of these nests; 1 has been deserted; 5 have been destroyed, 3 by raccoons and 2 by squirrels.

Sick and dead raccoons have been obtained for autopsy from time to time since August 1956. Approximately half of these animals had lead in their livers. During the late fall and early winter of 1958 it became apparent that most raccoons found sick or dead had varying concentrations of lead in their livers. In order to learn more about the incidence and meaning of lead in raccoons, livers were collected from 100 raccoons killed by hunters and trappers during the 1958-59 season. These were mostly collected at fur buying stations in Piatt and Fulton counties. Ninety-nine of the 100 were found to contain lead, ranging from 2 to 32 micrograms per gram of liver. Thirty-seven of the 100 had 4 micrograms and only 10 animals had more than 10 micrograms. The average amount was 7 micrograms.

These animals apparently were healthy and were normal so far as amount of body fat was concerned. Condition factors were calculated for these animals and those with more than 10 micrograms of lead per gram of liver were in just as good physical condition as those with 10 micrograms or less. The ratio of adrenal weight to body weight did not indicate that the animals with higher lead concentrations were under stress any more than those with low concentrations. Thus it does not seem that these amounts of lead alone are enough to cause the death of the raccoons.

During the first 4 months of 1952, 14 sick and dead raccoons also were received from Edwards, Edgar, Gallatin, Morgan, Wayne, and Platt counties. Thirteen of these were checked for lead and without exception they showed lead present ranging from 4 up to 24 micrograms per gram of liver. Six also had pneumonia and six did not. In some cases lung flukes and round worms appeared to be involved in the pneumonia. Condition factors for these animals, which were sick or dead when found, indicate that they were in poor physical condition. The adrenal-body weight ratios also indicate that they were under severe stress. They showed symptoms that are typical of lead poisoning, but as indicated above, lead is probably not the whole answer. Lead may be carried in the body with little apparent harm until the animal meets with some unusual stress factor such as starvation, low calcium or phosphorus diet, disease or infection, or any one of a number of other factors.

Sick and dead raccoons have been obtained for autopsy during the past 5 months with greater regularity than at any other time during the past 10 years of working with raccoons.

W-61-R-2

F. Greeley, J. Ellis

Fifty-nine hen pheasants were subjected to diets containing different amounts of calcium for the purpose of determining what effects different levels of calcium may exert on pheasants. From March 17 to April 12, all birds were fed a mash containing a high level of calcium (2.34 per cent). Nine birds, representing pre-experiment control, were autopsied on April 12 and their leg bones saved for determination of per cent of ash. The remaining birds were divided into five groups, and these groups were given respectively 0.37, 0.63, 1.09, 2.01, and 2.34 per cent of calcium in their diets. Laying of eggs had started in seven of the ten pens by April 13 and in nine of the ten pens by April 15. By April 17, eggs had been produced by some hens in all ten pens.

The rate of egg production was influenced by the amount of calcium in the diet, table 1. From April 13-23, hens given 0.63 or 1.09 per cent of calcium produced eggs at about 2.5 times the rate of those on 0.37 per cent; and hens on 2.01 and 2.34 per cent of calcium produced eggs at a rate about 4 times the rate of those hens given the least calcium.

By April 23, the hens with the lowest calcium diet had nearly ceased laying eggs, and half of the birds on each diet were killed for bone-ash determination. The remaining birds continued to display the effects of different amounts of calcium in their diets on egg production, table 1. Many eggs from hens on the two lowest levels of calcium produced eggs with very thin shells; eggs of this quality would scarcely be expected to survive incubation in the wild.

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Table 1.--Production of eggs among hen pheasants given different levels of calcium in the diet.

Per Cent Calcium	April 13-23			April 24-29		
	Number of Eggs	Number of Hens	Eggs/ Hen/Day	Number of Eggs	Number of Hens	Eggs/ Hen/Day
0.37	14	10	0.13	4	5	0.13
0.63	35	10	0.32	7	5	0.23
1.09	33	10	0.30	13	4	0.54
2.01	57	9-10	0.54	15	4	0.63
2.34	56	10	0.51	16	5	0.53
Total	195	49-50	0.36	55	23	0.40

An effort was made to locate cock pheasants on the Neoga and Bellmont areas by the use of crowing counts, triangulation, and farmer interviews. On the Neoga area, 12 cocks were located. An average of 0.45 calls per two-minute stop was recorded during the peak of crowing activity for the month; the comparable count for April, 1958, was 2.6 calls per stop.

At Bellmont, 11 individual cocks were located. An average of 1.8 cock calls per stop was recorded during the peak of crowing activity during April; the comparable count for April, 1958, was 52 calls per stop.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

May 1959

Vol. 2, No. 5

W-30-R-12

R. F. Labisky

Renesting by pheasant hens, following the disruption of a previously established nest, has been accepted as commonplace. Yet, actual evidence of renesting among wild pheasant hens is negligible. In order to investigate the occurrence of renesting in a wild population, the nests of 23 wild hens on the Sibley area were disrupted during June, 1957. The hens whose nests were disrupted were trapped on the nest, marked for individual recognition to enable identification during subsequent observations, and released. Four of the 23 wild hens (17.4 per cent) were observed with a brood of chicks later in the summer; this evidence of renesting is considered conservative because some of the other hens in this group also may have reared broods but were not observed. If the nest success among the renesting hens was similar to the annual, over-all, nest success of nearly 34 per cent in 1957, it can be conjectured that in addition to the four hens that renested successfully, eight of the other hens in the group probably renested but were unsuccessful. These observations hypothetically suggest that about 50 per cent of the hens whose nests were disrupted did attempt to renest during the same summer. Although these data were limited by the small sample size, the findings provide positive evidence that renesting does occur in wild populations.

W-42-R-8

R. D. Lord

The analysis of evidence from 291 rabbits collected monthly during 1958 has resulted in the construction of a life table for Illinois cottontails employing age-specific reproductive and mortality rates. The construction of this life table shows that nearly 85 per cent of the rabbits born each summer, die during their first 3 months. This fact points up the importance of good nesting cover for cottontails and the reason why fields of Erigeron and clover produce many rabbits each fall (such fields provide protective cover for the small weanlings while they are growing).

Examination of 23 hair-mats (remains of dead rabbits) on the Allerton Park 4-H Area showed that 8 contained shot pellets (table 1).

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Table 1.--Number and size of shot pellets found in hair-mats.

Mat Number	Total Number of Shot Pellets	Size of Shot*
1	3	#8(1), #9(1), #?(1) (lost)
2	1	#6
3	1	#6
4	16	#8(14), #9(2)
5	10	#6
6	6	#8(5), #5(1)
7	2	#6
8	1	#5

* The shot pellets were measured with a pair of precision calipers and compared pellets of known size.

During March, 39 live rabbits were trapped on the Allerton Park 4-H Area and x-rayed for the presence of shot pellets; 5 were found to contain shot.

= Table 2.--Number and size of shot pellets found in x-rayed rabbits.

Rabbit Number	Number of Shot Pellets	Size of Shot*
984	1	? (flattened against bone)
966	1	#6
799	1	#6
743	2	#4
963	1	#5

* The size of the shot in the x-ray pictures was determined by comparison with an x-ray picture of shot pellets of known size.

The presence of a few shot pellets in apparently healthy rabbits raises the question of the significance of one or two pellets in hair-mats. There were, however, three hair-mats which contained a sufficient number of pellets as to leave little doubt concerning the cause of the death of the rabbits.

W-55-R-3

F. Bellrose

This project was inactive during May.

W-56-R-3

G. Sanderson, K. Johnson

Natural cavities suitable for use by wood ducks in the Havana area were inspected at weekly intervals to determine the extent of wood-duck nesting activity. The number of nests located and the number successful thus far appear in table 1.

Table 1.--Number of nests in natural cavities and success to May 25, 1959

Study Unit*	Number of Nests	Number		
		Unsuccessful	Successful	Still Under Incubation
I	9	6	0	3
II	14	7	6	1
III	17	2	6	9
IV	5	2	2	1
Total	45	17	14	14

*Unit I - Predator-proof Nest-house Unit; Unit II - Control Unit; Unit III - Tanglefoot Unit (not yet treated with Tanglefoot); Unit IV - Outside of study area.

One nest was deserted. Factors responsible for destruction of the other 16 unsuccessful nests were: raccoons 9, squirrels 3, unidentified mammals 3, and tree damage 1. One wood duck hen was killed on the nest in a natural cavity by a raccoon. This was the first nesting hen to be killed by a predator during the current study.

Returns from 52 of the 109 licensed furbuyers in Illinois revealed only minor changes in the prices paid for raw furs during the past 2 seasons in Illinois (table 2).

Table 2.--Average prices paid to Illinois hunters and trappers for raw furs during the 1957-58 and 1958-59 seasons.

Species	Average Price Per Pelt	
	1957-58	1958-59
Mink	\$10.23	\$11.05
Beaver*	4.69	4.59
Raccoon	.91	.77
Skunk	.79	.80
Muskrat	.71	.68
Weasel	.43	.57
Red Fox	.21	.33
Gray Fox	.11	.20
Opossum	.13	.15

*Prices on beaver are for the 1957 spring season and 1958 spring season.

W-61-R-2

F. Greeley, J. Ellis

Different levels of calcium were fed to hen pheasants during April and May in an effort to establish standards of the effects of low calcium which may be used to detect calcium deficiencies in wild birds. Egg production continued low at calcium levels of 1.09 per cent or less, but the birds receiving 2.01 and 2.34 per cent of calcium produced nearly one egg per day (table 1).

Although the weights of eggs appeared to vary slightly with the amount of calcium in the feed (table 1), the weights and volumes as well, appeared to be characteristic of individual hens rather than of calcium in the diet.

In two hens fed low calcium diets, the bones were noticeably weak and brittle. These birds were autopsied for bone ash determination.

Table 1.--Weights of eggs (in grams) from pheasants fed different levels of calcium.

Period	Per Cent Calcium in Diet									
	0.37		0.63		1.09		2.01		2.34	
	No.	Avg.	No.	Avg.	No.	Avg.	No.	Avg.	No.	Avg.
	Eggs	Weight	Eggs	Weight	Eggs	Weight	Eggs	Weight	Eggs	Weight
April 13-May 31	19	31.2	54	29.2	66	30.4	192	32.8	230	32.8

Four pheasant crowing counts were made on the Bellmont area and one on the Neoga area during May. Average cock calls per 2 minute stop ranged from 0.45 to 1.73 on the Bellmont area. Thus far, 14 individual cocks and 6 hens have been located at Bellmont. During the crowing count taken at Neoga, one cock was heard to call. Twenty-seven individual pheasants have been located on the Neoga area, 15 of which were hens.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

June 1959

Vol. 2, No. 6

W-30-R-12

R. F. Labisky

An indication of accelerated postnesting mortality of pheasant hens can be obtained by determining the proportion of broods unaccompanied by hens during late summer. The causes of postnesting mortality of pheasant hens may be associated with the physiology of the hens. Studies in Wisconsin with penned birds have shown that the hen reaches an annual, physiological low in midsummer, which apparently results from accumulated stresses caused by nesting and molting. Thus, it is reasonable to assume that prolonged nesting seasons could cause a higher rate of late-summer mortality of hens because of extended physiological stress.

Findings from the Sibley area indicated a brood-hen mortality of 3.0 per cent in 1956, 11.4 per cent in 1957, and 5.7 per cent in 1958. (Broods that were 10 or more weeks in age, but unaccompanied by hens, were excluded from these data because behavior observations have shown that brood members are "weaned" at about 10 weeks of age.) The establishment of nests by pheasant hens spanned a period of 15 weeks in 1957 and 11 weeks in 1958; similar data are not available for 1956, but the nesting season was considered to be shorter (or earlier) than those of 1957 and 1958. These findings support the premise that accelerated postnesting mortality of hens coincides with extended nesting seasons.

W-42-R-8

R. D. Lord

Sixty-five early-morning roadside censuses and 29 nighttime spotlight censuses were made from May, 1957 to December, 1958. In both years more rabbits were seen per mile during the spotlight census than during the early-morning census, except during the 3 summer months, May, June, and July.

Data for approximately 2 months of activity of caged rabbits, based on a recorder connected to a treadle in an out-of-doors cage, indicate a shift from a decidedly nocturnal pattern to a 24-hour pattern with early-morning and evening peaks. Six all-night roadside censuses extending into daylight made during the past 3 months, on a 22 mile route at an average speed of 22 mph indicate a correlation between activity trends in roadside activity and activity trends based on the activity-recorder.

Reproduction (prevalence of pregnancy and average litter size) of cottontails was calculated from samples of rabbits of all ages taken each month of the breeding season. As the age of the rabbits increased there was an

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apparent trend toward larger litters. The greatest prevalence of pregnancy was evident in rabbits 1 year old.

Although rabbits may breed when only 2 months old, analysis of the pregnancy of rabbits by their month of birth indicated that most juvenile rabbits are 4 or 5 months old when they breed. The contribution of juvenile breeding to the annual crop present on November 1, 1958 was 18.79 per cent.

An experiment was made to test the effect on rabbit populations of mowing paths in continuous vegetation, mostly grass and forbs. The field with mowed paths was used more frequently by rabbits than unmowed fields.

A count of pellets in 5,060 quadrats in hay, corn, and soybean fields showed hay fields to be the most used and soybean fields the least used by rabbits in August.

Investigations of rabbit fecal pellets show the rate of disappearance of the pellets to be an important variable affecting pellet-count censuses on different kinds of soils under different vegetative cover. The main cause of the disappearance of pellets seems to be earthworms.

W-55-R-3

F. Bellrose

This project was inactive during May.

W-56-R-3

G. Sanderson, K. Johnson

Live-trapping for raccoons and opossums was begun on April 21st this year. Nine adult male raccoons and three adult females have been trapped, four of which had been caught and marked in 1958. Trapping was relatively poor, probably because large numbers of periodic cicadas appeared on the area about the end of May and continued to be very abundant until about the last week in June. Raccoons, opossums, mice, birds and other animals took advantage of this readily available food supply.

Three adult male opossums and 19 adult females were live-trapped on the study area; 5 had been marked in 1958. None of the 118 young which were toe-clipped for identification in 1958 when they were still in the female's pouch has been trapped this year. However, three of the young born this year have been caught, one of which had been marked by toe-clipping when in the pouch. Thirteen of the adult females trapped had litters totalling 101 young, an average of 5.3 young per litter. The sex of the young in these litters follows: 39 males, 37 females, and 25 too young (approximately 1 day of age) to sex accurately. All were marked by toe-clipping for future identification.

Data collected during the past raccoon-hunting and trapping season show that all sex and age groups of raccoons averaged somewhat less in weight

The first of these is the fact that the United States is a young nation, and its history is therefore a history of growth and development.

The second is the fact that the United States is a nation of immigrants, and its history is therefore a history of the struggle for a new identity.

The third is the fact that the United States is a nation of diverse peoples, and its history is therefore a history of the struggle for unity.

The fourth is the fact that the United States is a nation of free men, and its history is therefore a history of the struggle for liberty.

The fifth is the fact that the United States is a nation of progress, and its history is therefore a history of the struggle for improvement.

THE HISTORY OF THE UNITED STATES

The history of the United States is a story of growth and development, of struggle and achievement, of unity and diversity, of liberty and progress. It is a story that has shaped the nation and the world, and it is a story that continues to shape us today.

The history of the United States is a story of the struggle for a new identity, of the struggle for unity, of the struggle for liberty, and of the struggle for improvement. It is a story that has shaped the nation and the world, and it is a story that continues to shape us today.

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than they did during the 1957-58 season. Adult males averaged 16.2 pounds and juvenile males 11.1 pounds. Parous females averaged 13.2 pounds and nulliparous females 10.4 pounds.

Condition factors, a reflection of the animal's body condition, for the past two seasons also indicate that all groups were in poorer condition during the 1958-59 season than during the 1957-58 season. As expected, adult males had the best body condition each year. They were followed by parous females and then juvenile males and nulliparous females.

W-61-R-2

F. Greeley, J. Ellis

The experiment on the effects of different amounts of calcium in the diets of laying hen pheasants was concluded in the first week of June. On April 13, 9 hens had been killed while they were still eating a high level of calcium and some had started laying eggs; on April 24, 26 hens were killed after those placed on low calcium diets on April 13 had ceased laying for 3-4 days; on June 3-5, 20 hens were killed, a large series of eggs having been laid by those birds on higher levels of calcium. Four hens died during the experiment.

All birds were autopsied. Counts of ovulated follicles were made on all but two hens; the follicle counts indicated that, among hens on low calcium diets, about twice as many ovulations occurred as there were eggs found although the eggs were collected twice daily. Some of this discrepancy may have resulted from ovulation and resorption of eggs in the body cavity, eggs laid without shells or membranes and being lost through the wire floors (rats thrived beneath the pens and may have eaten such yolks and whites), or errors in counting ovulated follicles. Among hens fed sufficient calcium to continue laying, fewer ovulated follicles were counted than there were eggs found, but among hens fed less calcium, more ovulated follicles were counted than there were eggs found. Evidence that the birds fed low calcium diets had eaten eggs was rarely found. All hens had large, unovulated follicles and unresorbed, ovulated follicles indicative of recent laying, however. Most hens, regardless of the amount of calcium in the diet, had new eggs, with shells, in the oviduct. In spite of possible errors in counting ovulated follicles, it seems evident that more eggs were ovulated by hens on low amounts of calcium than could be accounted for by the number of eggs laid. Nevertheless, it was evident that low calcium in the diet did restrict egg production.

Field data from the Neoga and Bellmont areas indicates that pheasant brood production is down when compared with 1958. On the Neoga area 16 pheasant broods had been located by the end of June, 1958. This year, however, four broods have been located; two were observed by project personnel, and two were reported by farmers. The broods ranged in size from 1 to 15 chicks; average size was 8.5 chicks per brood, approximately the same as recorded in 1958. Ages of the pheasant chicks ranged from 1 to 8 weeks; average age was 5 weeks.

On the Bellmont area, 12 pheasant broods had been located as of June 30, 1958. This year, 6 broods have been located during a comparable period. Average brood size, however, was greater in 1959 than in 1958, 8.7 compared to 4.8. The ages of the broods observed ranged from 2 to 8 weeks; average age was 4 weeks.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana

July, 1959

Vol. 2, No. 7

W-30-R-13

R. F. Labisky

On the Sibley area, tame hayfields yielded 46.8 and 69.9 per cent of all established pheasant nests in 1957 and 1958, respectively. However, the rate of nest establishment varied considerably among hayfields containing different grass or legume dominants (see table). Although these data need further refinement, the findings tentatively suggest that hayfields dominated by brome grass or sweet clover tend to provide better nesting cover than do those dominated by timothy, red clover, or alfalfa.

Dominant Hayfield Cover Types	Nests Established Per 100 Acres	
	1957	1958
Brome Grass	395.6(13)*	217.7(32)
Sweet Clover	110.4(31)	224.7(20)
Timothy	49.1(4)	56.0(7)
Red Clover	27.7(8)	121.2(88)
Alfalfa	10.6(2)	78.2(39)
Total or Mean	67.3(58)	117.3(186)

*Sample sizes (number of nests) in parentheses.

W-42-R-9

R. D. Lord

From a sample of 116 rabbits taken from country roads in July, it was determined that there was a 20 per cent overlap in the weights of juvenile and adult rabbits. The age of these rabbits was checked by two methods: the epiphyseal-closure technique and the lens method. Thus on the basis of size alone, a mid-July census, commonly used to determine productivity in rabbits, must be wrong in estimating age at least 20 per cent of the time. If the overlap were equal, that is, if 20 per cent of the juveniles were as heavy as adults and 20 per cent of the adults were as light as juveniles, this would make little difference to census results; but the proportion of juveniles in the overlap area

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W-42-R-9

R. D. Lord

was 27.8 per cent and that of adults was 17.5 per cent. This error can be crucial in estimating the probable population later in the year because it is the large juveniles that will breed and contribute a significant proportion of the annual crop.

The July issue of the Journal of Wildlife Management contained two articles originating from this project. One was, "The Lens as an Indicator of Age in Cottontail Rabbits" and the other a joint report with Ronald Labisky, was, "A Flexible, Plastic Eartag for Rabbits."

W-55-R-4

F. Bellrose

This project was inactive during July.

W-56-R-4

G. Sanderson, K. Johnson

Field work was continued on the raccoon and wood-duck project in the Havana area through the duck nesting season. Twenty-nine per cent of the natural cavities were used by wood ducks. A similar study in the same region indicated that 51 per cent of the cavities were used by wood ducks in 1939 and 1940.

Where a direct comparison could be made, 44 per cent of the nests in natural cavities were successful during the current study and 49 per cent during the 1930-40 study. When both natural cavities and nest houses were present on the same area, wood ducks showed a slight preference for natural cavities.

Raccoons were responsible for 38 per cent of the nests destroyed during the two years of the current study, but they cannot be said to be the one factor limiting wood-duck nest success; the total success was about the same as during the earlier study when raccoon populations were at a lower level than they are now. During the earlier study, raccoons destroyed 37 per cent of the wood duck nests in wooden boxes. Fox squirrels destroyed 23 per cent of the unsuccessful nests in natural cavities.

No nests were destroyed by raccoons in the trees banded with "Tanglefoot."

During July, 57 raccoons were live-trapped 85 times on the Allerton Park study area. Thirty-four were young-of-the-year: 20 females and 14 males. Nine of the 12 females had been captured previously, seven of them in 1958 and two in 1957.

Forty-six opossums were live-trapped 82 times. Thirty-one were young-of-the-year: 15 females and 16 males. One of the two adult males was first caught in 1958, the other this year. Six of the 13 adult females were recaptures, including two that were first caught in 1958 and four in 1959.

Eleven of the 13 adult females were carrying 102 pouch young. The litters ranged from six to twelve young each and averaged 9.13. All pouch young were toe-clipped. Of the 68 pouch young for which sex could be determined, 40 were

females and 28 were males. Of the 31 young-of-the-year opossums later live-trapped separately, nine (29 per cent) had been toe-clipped while in the pouch and represented 8.8 per cent of the pouch young that had been toe-clipped.

W-61-R-3

F. Greeley, J. Ellis

A job completion report on the distribution of pheasants in Illinois was prepared. Data from rural mail carrier counts of pheasants were analyzed. The results indicated that there was a 10 to 20 per cent decline in the state's pheasant population between 1957 and 1958. During this same period, decline in pheasants was reported by biologists in Wisconsin and Michigan, but large increases were reported in the states to the west of Illinois.

The thickness of the shells of pheasant eggs was found to be significantly correlated to the amount of calcium in the diet of the hen, table 1.

The average thickness of the shells of 309 eggs from wild hens on the Sibley area was 254 ± 1 micra. The thickness of the shells of eggs from the Sibley area was equal to that of shells from game-farm hens fed two per cent of calcium in the diet.

Table 1.--The thickness of eggshells from hen pheasants fed different amounts of calcium.

Per Cent of Calcium in the Diet	Number of Eggs	Thickness of Shell (micra)	
0.37	17	213	11
0.63	48	220	5
1.09	61	223	4
2.01	198	254	1
2.34	243	270	1

Continued field work was directed toward locating pheasant broods on the Neoga and Bellmont areas during July. Seven broods that had not been previously observed were located on the Bellmont area during July. A total of 19 broods have been located on the area during the 1959 breeding season. The average size of all broods was 6.0 chicks per brood and the average age for all broods was 5.9 weeks. Twenty-three adult pheasant hens were observed on the area during July; eleven (48 per cent) of the 23 hens were accompanied by broods.

One hundred and seventy-five miles of road were cruised during early morning on the Neoga area, but no broods were observed during these counts. Four

The first part of the paper is devoted to the study of the properties of the function $f(x)$ defined by the equation $f(x) = \int_0^x f(t) dt$. It is shown that $f(x)$ is a constant function, and its value is determined by the initial condition $f(0) = 1$.

In the second part, we consider the problem of finding the maximum value of the function $f(x)$ on the interval $[0, 1]$. It is shown that the maximum value is attained at $x = 0$ and is equal to 1. This result is obtained by using the properties of the function $f(x)$ and the fact that $f(x)$ is a constant function.

The third part of the paper is devoted to the study of the properties of the function $f(x)$ defined by the equation $f(x) = \int_0^x f(t) dt$. It is shown that $f(x)$ is a constant function, and its value is determined by the initial condition $f(0) = 1$.

In the fourth part, we consider the problem of finding the maximum value of the function $f(x)$ on the interval $[0, 1]$. It is shown that the maximum value is attained at $x = 0$ and is equal to 1. This result is obtained by using the properties of the function $f(x)$ and the fact that $f(x)$ is a constant function.

Table 1		
x	$f(x)$	$f'(x)$
0	1	0
0.1	1	0
0.2	1	0
0.3	1	0
0.4	1	0
0.5	1	0
0.6	1	0
0.7	1	0
0.8	1	0
0.9	1	0
1	1	0

The fifth part of the paper is devoted to the study of the properties of the function $f(x)$ defined by the equation $f(x) = \int_0^x f(t) dt$. It is shown that $f(x)$ is a constant function, and its value is determined by the initial condition $f(0) = 1$.

In the sixth part, we consider the problem of finding the maximum value of the function $f(x)$ on the interval $[0, 1]$. It is shown that the maximum value is attained at $x = 0$ and is equal to 1. This result is obtained by using the properties of the function $f(x)$ and the fact that $f(x)$ is a constant function.

broods were located on the area at other times during July; two were reported by farmers, and two were observed by project personnel. A total of eight broods have been located on the Hoga area this year. The average size of the eight broods observed was 7.5 chicks per brood, and the average age was 5.5 weeks.

1922-1923

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

August 1959

Vol. 2, No. 8

W-30-R-13

R. F. Labisky

The standardized counts of pheasant broods taken on the Sibley area during July and August, 1959, indicated a decline in the production of broods when compared to similar counts taken during 1958. The number of broods observed along 640 miles of roadside transect decreased from 240 broods in 1958 to 197 broods in 1959, or 17.9 per cent. Comparable counts for 1957 showed a total of 194 pheasant broods.

A description and evaluation of the method of capturing animals, particularly pheasants, by using bright lights at night was published as Illinois Natural History Survey Biological Note No. 40, July, 1959; the paper, which originated from this project, is entitled, "Night-lighting: A Technique for Capturing Birds and Mammals."

W-42-R-9

R. D. Lord

The August sample of rabbits taken for the study of cottontail reproduction showed an increased average litter size over the past 2 months. This is indicative of the effect of the increased average age of the breeding females. Older females tend to have the largest litters. The prevalence of pregnancy was the same as last August. Only 16 per cent of the breeding females were juveniles compared with 55 per cent in 1958 and 56 per cent in 1959. Perhaps this is a result of the lower proportion of juveniles this August (39 per cent, compared with 58 per cent in 1958 and 56 per cent in 1957). Because reproduction has been very close to last year's reproduction, the markedly lower proportion of juveniles in the August sample indicates a higher juvenile mortality this year.

W-55-R-4

F. Bellrose

This project was inactive during August.

W-56-R-4

G. Sanderson

Preliminary tabulations of trapping data provide a basis for a fairly accurate delineation of the home ranges of opossums in east-central Illinois. Young-of-the-year females have home ranges that are only about half as large as the average home range of young-of-the-year males. Adult females have home ranges that are approximately the same size as those of young-of-the-year males. Although only two adult males were retrapped six or more times each in three or more

locations, their average home ranges were quite large, averaging more than five times those of young-of-the-year males.

Individual home ranges varied from 6.4 acres to 120.2 acres for adult females and from 5.0 to 52.4 acres for young-of-the-year females. Two adult males had home ranges which were 110.3 and 440.3 acres respectively. Home ranges of young-of-the-year males varied from 8.9 to 82.6 acres. Both young-of-the-year animals and adult females were captured repeatedly in only one or two traps over periods of up to 2 months while others ranged widely from day to day. Thus, the variation in sizes of individual home ranges and the fact that an animal may be captured repeatedly in a restricted area over a period of months indicated that opossums exhibit different types of movements. Some individuals, especially adult males, moved widely over the area while others restricted their movements to small areas.

W-61-R-3

F. Greeley, J. Ellis

The percent of ash in the femur and tibia bones of laying hen pheasants was determined. The per cent of ash in the bones was correlated with the amount of calcium in the diet (see table). The amount of ash in the bones declined from late April to early June, especially with restricted calcium intake. The femurs of road-killed wild hens in laying condition contained a higher per cent of ash (mineral) than the game-farm hens fed the highest level of calcium (2.34 per cent). The high per cent of ash in the bones of wild birds may have been due to early termination of egg production and onset of incubation, higher level of calcium in the diet, better assimilation of calcium from the digestive tract, or a more favorable ratio of calcium to phosphorus in the diet. All of these are known to effect the calcium content of the bone.

Percentage of bone-ash in laying hen pheasants fed different amounts of calcium.

Per Cent Calcium in Diet	Number of Hens	Per Cent of Ash	
		Femur	Tibia
2+ (Pre-laying, controls)	9	66.77 $\pm$ 0.27*	63.54 $\pm$ 0.59
0.37	10	64.24 $\pm$ 0.86	59.90 $\pm$ 0.66
0.63	10	64.12 $\pm$ 0.67	60.36 $\pm$ 0.47
1.09	9	65.27 $\pm$ 0.78	61.25 $\pm$ 0.55
2.01	10	66.58 $\pm$ 0.43	62.06 $\pm$ 0.57
2.34	10	66.98 $\pm$ 0.31	64.15 $\pm$ 0.59
? (Wild, laying)	12	68.76 $\pm$ 0.95	-----

* Mean $\pm$ Standard Error.

1. The first part of the report discusses the general situation of the company and the results of the previous year. It also mentions the main objectives for the current year.

2. The second part of the report describes the activities carried out during the year, including the implementation of the business plan and the achievement of the set targets.

3. The third part of the report presents the financial results of the company, showing a steady increase in revenue and a decrease in expenses.

4. The fourth part of the report discusses the company's position in the market and the competitive environment, highlighting the company's strengths and weaknesses.

5. The fifth part of the report concludes with a summary of the main findings and recommendations for the future.

6. The sixth part of the report discusses the company's future prospects and the potential for growth, taking into account the current market conditions and the company's resources.

7. The seventh part of the report discusses the company's social and environmental responsibilities, highlighting the company's commitment to sustainable development.

8. The eighth part of the report discusses the company's human resources and the measures taken to improve the working conditions and the skills of the employees.

9. The ninth part of the report discusses the company's legal and regulatory compliance, ensuring that the company operates within the framework of the law.

10. The tenth part of the report discusses the company's risk management and the measures taken to mitigate the potential risks.

Appendix A: Financial Data	
Year	Revenue (USD)
2018	1,200,000
2019	1,500,000
2020	1,800,000
2021	2,100,000
2022	2,400,000
Year	Expenses (USD)
2018	800,000
2019	950,000
2020	1,100,000
2021	1,250,000
2022	1,400,000
Year	Profit (USD)
2018	400,000
2019	550,000
2020	700,000
2021	850,000
2022	1,000,000

Appendix B: Market Data	
Year	Market Share (%)
2018	15
2019	18
2020	22
2021	25
2022	28

Appendix C: Human Resources Data	
Year	Number of Employees
2018	50
2019	60
2020	70
2021	80
2022	90

Six pheasant broods that had not been previously observed were located on the Bellmont area during August, 1959. A total of 27 individual broods were located on the Bellmont area during the 1959 nesting season. The average size of the broods (based on 37 complete counts of chicks in broods observed one or more times) was 5.8 chicks per brood, and the average age was 7.3 weeks. The observed broods ranged in size from 1 to 12 chicks and ranged in age from 3 to 14 weeks. Nine broods were observed while driving 188 miles of roadside transect during early morning brood counts (4.8 broods per 100 miles). Fifty-five (2488:3188) individual pheasants were located on the area during the summer of 1959.

A total of nine pheasant broods were located on the Neoga area during the 1959 nesting season; no brood was observed more than once. The average number of chicks per brood was 6.8, and the average age of the chicks in the nine broods was 6.0 weeks.

2. The second part of the document focuses on the implementation of the proposed changes. It details the steps involved in the process, from the initial planning stage to the final execution. This section also addresses the potential challenges that may arise during the implementation phase and provides strategies to overcome them.

3. The third part of the document discusses the long-term impact of the changes. It highlights the benefits that the organization can expect to realize, such as improved efficiency, reduced costs, and enhanced customer satisfaction. This section also outlines the ongoing monitoring and evaluation process to ensure that the changes continue to deliver the desired results.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

September 1959

Vol. 2, No. 9

W-30-R-13

R. F. Labisky

Field investigations of the reproductive ecology of pheasants on the intensively cultivated Sibley area in 1959 were completed in September. The 100, randomly selected 10-acre study plots (representing a 4.3 per cent sample of the 23,200-acre study area) that were searched for nests in 1957 and 1958 were again searched in 1959. The search in 1959 yielded 236 nests, or 11.3 per cent fewer nests than were located in 1958 when 266 nests were found. In 1957, only 124 pheasant nests were found on the study plots. Comparisons of establishment and success of pheasant nests as related to cover types for the 1957, 1958, and 1959 nesting seasons are summarized in table 1.

Table 1. A comparison of establishment and success of pheasant nests by cover type, Sibley study area, 1957, 1958, and 1959.

Cover types	Nests Established			Nests Successful		
	1957	1958	1959	1957	1958	1959
Row Crops	0.0(0)	0.0(0)	0.0	0.0(0)	0.0(0)	0.0(0)
Small Grains	16.1(20)*	7.9(21)	24.2(57)	55.0(11)	33.3(7)	38.6(22)
Hayfields						
(Tame)	46.8(58)	69.9(186)	44.9(106)	32.8(19)	31.2(58)	19.8(21)
Pastures (Tame						
and Wild)	24.2(30)	6.0(16)	14.4(34)	16.7(5)	50.0(8)	17.6(6)
Strip-Cover	12.1(15)	15.8(42)	13.1(31)	40.0(6)	11.9(5)	22.6(7)
Non-Agri-						
cultural	0.8(1)	0.4(1)	3.4(8)	100.0(1)	100.0(1)	0.0(0)
Totals						
or Means	100.0(124)	100.0(266)	100.0(236)	33.9±8.4*(42)	29.7±6.5(79)	23.7±5.5(56)

*The first figure is the per cent of the total number of nests found; the figure within parentheses is the number of nests found.

**Fiducial limits at 0.05 level.

W-42-R-9

R. D. Lord

A three year study of reproduction in cottontails, involving nearly 1,000 rabbits, showed that the average monthly prevalence of pregnancy and litter size reported in a paper given at the 23rd North American Wildlife Conference were

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remarkably precise although based on a sample of only 223 rabbits. Data from the large sample indicated an average monthly prevalence of pregnancy of 0.60 and an average monthly litter size of 5.23 which may be compared with 0.59 and 5.58 obtained in the 1-year study in 1957. The average adult female rabbit that survived an entire breeding season produced 22 young.

May proved to be the month in which the greatest productivity occurred because of the large average litter size (6.68 young per pregnant female) and the high prevalence of pregnancy (83 per cent). The highest prevalence of pregnancy (92 per cent) occurred in March.

Although reproduction during the first four months of the 1959 breeding season was essentially the same as that of last year, the rate during the last three months has been so much higher that the total reproductive index for this year is 26.66 as compared to 21.08 for last year, an increase of at least 20 per cent. Yet the principle of inversivity appears to be working, for the juvenile to adult ratio in August was lower than last year's, and the juvenile ratio in September was only 3 per cent higher than last year's.

W-55-R-4

F. Bellrose

This project was inactive during September.

W-56-R-4

G. Sanderson

Field work on the raccoon and wood duck study for the past nesting season was terminated when active wood duck nesting ceased. The study showed that 29 per cent of the natural cavities were used by wood ducks as compared to 51 per cent reported for the same region in 1939 and 1940.

Forty-four per cent of the nests in natural cavities were successful during the current study; 49 per cent were successful during the 1939-40 period. When both natural cavities and nest boxes were present on the same area, wood ducks showed a slight preference for natural cavities.

Raccoons were responsible for 38 per cent of the nests destroyed during the two year period of the current study, but they did not control nesting success. Although raccoon populations are at a much higher level and wood duck populations lower now than they were during the 1939-40 period of study, they apparently destroy no greater percentage of the nests now than they did during the earlier period. During the earlier study, 49 per cent of the wood duck nests in natural cavities were successful as compared to 44 per cent successful during the present study. Fox squirrels destroyed 23 per cent of the unsuccessful nests in natural cavities. Nests in the trees banded with "Tanglefoot" were not destroyed by raccoons.

The height to the cavity was important in determining whether a cavity would be selected by a wood duck. Cavities from a few feet to 29 feet above ground were used less frequently than those 30 feet or more.

W-61-R-3

F. Greeley, J. Ellis

It has been observed in the literature that hen pheasants are heavier in early April than at any other time of the year. Game farm birds lose from 250 to 300 grams during the breeding season. This loss in weight has been associated with the production of eggs. Data obtained in 1959 from hens on low calcium diets indicated that restriction of egg production, as a result of calcium deficient diets, did not prevent loss of weight during the spring months, table 2.

Table 2. Changes in body weight of hen pheasants fed different amounts of calcium.

Per Cent Calcium	April 13-24		April 13-June 4	
	Initial Weight	Per Cent Loss	Initial Weight	Per Cent Loss
0.37	1203 $\pm$ 56*	5.8 $\pm$ 2.2	1216 $\pm$ 50	24.3 $\pm$ 2.1
0.63	1218 $\pm$ 33	2.5 $\pm$ 2.0	1176 $\pm$ 48	12.8 $\pm$ 1.6
1.09	1165 $\pm$ 69	3.4 $\pm$ 3.5	1088 $\pm$ 67	8.0 $\pm$ 1.4
2.01	1041 $\pm$ 40	0.7 $\pm$ 2.3	1169 $\pm$ 59	7.6 $\pm$ 0.9
2.34	1111 $\pm$ 54	2.7 $\pm$ 2.7	1229 $\pm$ 68	10.8 $\pm$ 0.7

* Mean Standard Error in grams.

The production of eggs may, therefore, not be the only cause of the loss in weight which accounts for the poor physical condition of hens following the breeding season. Calcium deficiency, in this case, may have caused the loss of weight, or the loss may have been due to unknown factors in the physiology or the environment of the hen.

The number of pheasant broods produced on the Neoga and Bellmont areas during 1959 was less than the number of broods produced during either 1957 or 1958 (see table 3). Eight broods that had not been previously observed were located on the Bellmont area during September; these additional broods bring the total number of broods observed on the Bellmont area in 1959 to 35.

Record-Keeping Requirements

According to the Internal Revenue Service (IRS), taxpayers are required to keep records that will substantiate the amounts reported on their tax returns. The specific requirements vary depending on the type of transaction and the taxpayer's filing status.

For example, if a taxpayer is claiming a deduction for charitable contributions, they must keep records that show the date of the contribution, the name of the charity, and the amount of the contribution. If the contribution is in cash, a receipt from the charity is required. If the contribution is in kind, a receipt from the charity and a statement from the taxpayer describing the property are required.

Similarly, if a taxpayer is claiming a deduction for medical expenses, they must keep records that show the date of the expense, the name of the medical provider, and the amount of the expense. If the expense is for a medical procedure, a receipt from the medical provider is required. If the expense is for a medical device, a receipt from the medical provider and a statement from the taxpayer describing the device are required.

In general, taxpayers should keep records for at least three years after the date of the transaction. However, if the transaction involves a deduction for a capital asset, the records should be kept for at least seven years. If the transaction involves a deduction for a charitable contribution, the records should be kept for at least six years.

It is important to note that the IRS has the right to request records at any time. Therefore, taxpayers should be prepared to provide records if requested. Failure to provide records may result in the disallowance of the deduction and the assessment of a penalty.

Record-Keeping Tips

There are several tips that taxpayers can follow to ensure that they are keeping accurate records. First, taxpayers should use a consistent system for organizing their records. This could be a filing cabinet with folders for each year, or a computerized system. Second, taxpayers should keep records in a safe place, such as a fireproof safe or a secure online storage service.

Third, taxpayers should keep records for the full period required by the IRS. Fourth, taxpayers should keep records that are easy to access. This means that records should be organized in a way that makes it easy to find the records for a particular year or transaction. Finally, taxpayers should keep records that are accurate. This means that records should be kept in a way that reflects the actual transactions that took place.

By following these tips, taxpayers can ensure that they are keeping accurate records and that they are able to provide records if requested by the IRS. This will help to ensure that taxpayers are able to claim the deductions to which they are entitled and that they are not assessed any penalties.

Table 3. Brood data from Neoga and Bellmont study areas, 1957-1959.

Year	Neoga Area			Bellmont Area		
	No. Individual Broods Located	Average Size*	Average Age*	No. Individual Broods Located	Average Size*	Average Age*
1957	30	9.2	5.1	59	6.8	5.3
1958	45	6.5	5.2	49	4.9	6.4
1959	9	6.8	6.0	35	6.1	7.7

* When first observed.

At Bellmont, a meeting was held with area farmers to discuss plans for controlling pheasant hunting on the study area during the 1959 season. The system used last year required the hunters to obtain written permission from landowners and to report at a check station before and after shooting. The farmers agreed that this system should be continued in 1959.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

October 1959

Vol. 2, No. 10

W-30-R-13

R. F. Labisky

In 1959, the study of nesting ecology of pheasants on the intensively cultivated 23,200-acre Sibley area located in Ford and McLean counties, showed a decline in the production of young pheasants when compared to 1958 but an increase in production when compared to 1957 (see table 1). The data obtained from standardized counts of pheasant broods, although influenced by many variables, indicated similar trends.

Table 1.--Pheasant productivity on the Sibley area.

Category	1957	1958	1959
Number of Nests Established Per 100 Acres	12.4	26.6	23.6
Percentage Change Between Years	----	+114.5	-11.3
Number of Nests Hatched Per 100 Acres	4.2	7.9	5.6
Percentage Change Between Years	----	+88.1	-29.1
Broods Observed Per 100 Miles of Roadside	30.3	37.5	30.8
Percentage Change Between Years	----	+23.7	-17.9

W-42-R-9

R. D. Lord

Most of October was spent trapping, marking, and releasing rabbits. Seventy-one were captured, marked, and released on the Allerton 4-H area and 52 on the Sanctuary area.

Data were analyzed in preparation for a paper to be given at the Midwest Wildlife Conference. Analysis of reproduction in cottontails according to age as determined from the lens shows that average litter size increases with age of the female up to 3 years. (Only 3 rabbits out of 941 attained an age of 4 years.) Also, juveniles have the lowest prevalence of pregnancy and 1 year old rabbits the highest. Prevalence of pregnancy decreases slightly with increasing age after the first year.

The contribution of juvenile breeding to the annual crop was only 12.28 per cent this year as compared with 18 per cent last year. The reason for the drop lies in the lower proportion of juvenile breeding during July, August, and

September. The early start of juvenile breeding in June this year served only to keep the juvenile contribution from being lower than what it is.

W-55-R-4

F. Bellrose

This project was reactivated on September 24, 1959, when the first autumn census was taken of waterfowl populations in the Illinois and Mississippi River valleys. Since the initial aerial survey, two other complete waterfowl censuses were taken on October 1 and October 7. In addition, a spot check was made on October 12 in the Havana region following a pronounced waterfowl flight which arrived the night of October 11-12.

Up to mid-October this year waterfowl populations have been from 1.5 to 2.0 times larger in the Illinois River valley than they were during the same period of 1958. Widgeons and pintails have especially predominated in these early duck populations. The large increase in early migrating ducks is attributed to the tremendous increase in native duck food plants which were at an all time low in 1958.

In contrast to the increase in early duck numbers in the Illinois Valley, there have been fewer ducks along the Mississippi River in September and early October of 1959 than the year previously. Waterfowl food plant conditions are approximately the same in the Mississippi Valley this year as they were last year.

W-56-R-4

G. Sanderson

Live-trapping and tagging of raccoons and opossums was begun on the Allerton Park study area in Piatt County on April 21, 1959, and continued intermittently through October 29, 1959.

Seventy-seven raccoons were caught 163 times during this period. These included 15 adult males which were caught 20 times, 12 adult females caught 23 times, 17 young-of-the-year males caught 43 times, and 33 young-of-the-year females caught 77 times.

Male number 30, adult when first caught on May 20, 1957, was retrapped once in 1957, five times in 1958, and once in July of this year. Female number 44, lactating when first live-trapped on July 10, 1957, was retrapped twice in 1957, once in 1958, and again on July 5th and 13th in 1959. Eleven other adults were caught in both 1958 and 1959.

One hundred twenty-six opossums were live-trapped 398 times this year. One adult male was caught eight times, and one adult female was caught 29. Ninety-one young-of-the-year were caught 244 times.

No opossums captured in 1957 and only a few of those caught last year were caught in 1959.

W-61-R-3

F. Greeley, J. Ellis

A paper on the effects of calcium deficiency in hen pheasants was prepared, submitted and accepted for presentation at the Midwest Wildlife Conference at Minneapolis, Minnesota, in December.

An article entitled "California Pheasants in Southern Illinois," was prepared and accepted for publication in Illinois Wildlife.

Field data collected from the study of "California" pheasants on the Bellmont area were analyzed, and preparation of a job completion report was begun.

* * * * * SPECIAL NOTICE * * * * *

The cooperative research program of the Illinois Department of Conservation and the Illinois Natural History Survey involves the maintenance of a colony of captive raccoons in Urbana. This colony is extremely useful to the research project of which Glen Sanderson is in charge.

Normally, the raccoons in this colony are healthy and rarely become ill or die. On September 6, however, a young male which had been live-trapped on September 2 in Champaign County was found dead. At the time, it seemed probable that the animal had died as a result of injury received in trapping and handling. On September 30, however, two more raccoons were found dead, and, from October 1 through October 27, 11 more died. Up to the present time, 13 of the 21 young-of-the-year raccoons and two of the 28 adult animals which were in the colony on September 1 have died.

As soon as this mortality became evident, it was called to the attention of veterinarians at the College of Veterinary Medicine, University of Illinois, and the dead animals were submitted for determination of the cause of death. Every effort is being made to identify the disease and its cause. The disease may have been introduced into the colony when wild raccoons were added.

The symptoms of the disease are fairly consistent. There is a severe diarrhea accompanied by a foul odor. Sometimes the stool is bloody, and sometimes it is of the consistency of paste. In some cases animals live for a week or ten days after they first appear to be sick, but in other cases the animals show typical symptoms one day and are dead the next. The fur is unkempt and "scruffy," especially in animals which are ill for several days. For one to two days before death the animals show loss of appetite but do drink water. The animals are lethargic, especially the day before death. There is only one instance of a sick animal which recovered.

After death, a watery fluid with a foul odor may drain out at both the mouth and anus when the animal is lifted. All of the animals show severely inflamed intestines with the posterior one-third nearly always red to bright red. The cause of the disease is unknown, but the symptoms are similar to those of feline enteritis (sometimes called feline distemper) which was reported among raccoons in Wisconsin in the late 1930's.

If this disease is common among wild raccoons, it is virulent enough to have attracted attention, especially now that the hunting season is open. If you hear of sick or dead raccoons having these general symptoms, please contact Glen Sanderson at your earliest convenience. If you actually see raccoons with these symptoms, call collect at the Survey (FL 6-6491) so that we may follow up on any general outbreak of the disease. Your help will be greatly appreciated.

* * * * *

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

November 1959

Vol. 2, No. 11

W-30-R-13

R. F. Labisky

A summary of data collected from pheasant hunters on the Sibley area during the hunting seasons in 1956, 1957, 1958, and 1959, and the percentage of cocks harvested by hunters during each season are presented in table 1. In 1956 and 1958, normal fall weather prevailed during the hunting season, and this allowed for favorable hunting and moderate harvests of cocks. In 1957, hunting was difficult, and the harvest of cocks was very light because there were large areas of unharvested corn. In 1959, cold, snowy weather early in the season caused the pheasants to become flighty and wild. This made hunting difficult and limited the harvest of cocks.

Table 1.--Pheasant harvest data collected during the 1956, 1957, 1958 and 1959 hunting seasons, Sibley area.*

Year	Number of Hunters Interviewed	Number of Cocks Aged by Bursal Examination	Age Ratio of Bagged Cocks: Young/Adult	Gun-hours Per Bagged Cock	Percentage of Cocks Crippled	Percentage of Cocks Harvested During Season
1956	525	251	12.5	2.3	34.0	59.4
1957	443	290	4.7	3.5	24.4	12.4
1958	595	445	6.4	2.5	23.0	44.0
1959	461	454	5.6	2.9	17.8	----

*Daily bag limit in 1956, 1957, and 1958: 2 cocks; daily bag limit in 1959: 3 cocks. A 20-day open season, November 11-30 inclusive, in all years.

W-42-R-9

R. D. Lord

Analysis of data on reproduction of cottontails collected for the past three years shows that important differences occur in the amount of productivity in different years and between months within a year. The differences in

productivity between years is possibly due to different amounts of sunshine.

In 1957, the average prevalence of pregnancy for the first four months of the breeding season (containing 3/4ths of the annual productivity) was 0.68, and the total hours of sunshine for this period was 894. In 1958 the average prevalence was 0.77, and the total hours of sunshine was 1,006. And, in 1959, the average prevalence was 0.86 and the total hours of sunshine 1,021. Thus, for the three years of the study there was an increasing amount of sunshine with a corresponding increase in prevalence of pregnancy. In addition, in April of 1957, there were fewer hours of sunshine as compared to April of 1958 and 1959, and there was a corresponding drop in the prevalence of pregnancy. There was a similar trend in June and July of 1958.

W-55-R-4

F. Bellrose

During November, three aerial censuses were taken of the waterfowl populations in the Illinois and Mississippi River valleys (November 6, 14, and 23). Two additional censuses of waterfowl populations were taken in the Illinois River valley (November 10 and 17).

The main duck flight of the year occurred on November 5. Yet an aerial search on that day between the Illinois and Mississippi rivers revealed only a few flocks of migrating ducks. Apparently most of the ducks were migrating above the cloud layer, the bottom of which was at 1,500 and the top at 8,000 feet. Only small flights of waterfowl occurred after November 5, specifically on November 9, 10, 11, 12, and 13. By mid-November practically all ducks had departed from areas north and northwest of Illinois, and the state had its complement of wintering ducks. This is the earliest that the fall migration cycle has been completed in the last 20 years.

W-56-R-4

G. Sanderson

During the past spring, summer, and fall, 80 raccoons were live-trapped on the study area in Piatt County. Nine of these died in traps or were killed by dogs before the opening of the hunting season on October 15, 1959.

Seventeen (almost 24 per cent) of the remaining 71 marked raccoons were harvested during the first six weeks of the 1959-60 hunting season. During the entire 1958-59 hunting and trapping season slightly less than 20 per cent of the tagged raccoons were reported captured by hunters and trappers.

The disease present in the captive raccoon colony last month was still active during November although perhaps most of the susceptible animals were dead. Four additional young-of-the-year raccoons died during November. Thus, 17 of 21 young raccoons and 2 of 28 adults in the colony on September 1st died of the disease. Similar symptoms have not been reported in wild raccoons although one captive raccoon housed alone several miles from the rest of the

colony died of the same disease.

The disease was passed to a young raccoon by feeding her pieces of gut from one of the captive animals which had died. It died 7 days after eating the infected gut, and the symptoms were the same as those of previously infected animals.

University of Illinois veterinarians have successfully infected two ranch mink with material from the dead captive raccoons. Two mink which were fed pieces of gut on successive days died 7 days after eating the gut. The veterinarians plan to make further studies with the disease which appears to be a virus but not the same as feline enteritis. Vaccine against feline enteritis failed to protect captive raccoons from the disease, and feline enteritis causes different symptoms in ranch mink than does the raccoon enteritis.

W-61-R-3

F. Greeley, J. Ellis

A job completion report on the effects of calcium deficiency on laying hen pheasants was written. Statistical tests for significance of the data were begun. Preliminary summaries of these data were presented in earlier reports.

Fewer cock pheasants were killed on the Neoga and Bellmont areas in 1959 than in any previous year (see table 2). The lower kill was believed to have been influenced primarily by a decline in the numbers of pheasants. At Bellmont, however, conditions were not as favorable for hunting in 1959 as in 1958. In 1959, most of the corn on the area remained unharvested on the opening day of the season, and the weather was cool and wet during the season.

Table 2.--Pheasant hunting effort and kill at Neoga and Bellmont, 1957-1959.

Year	NEOGA		BELLMONT	
	Cocks Killed	Gun-hours Per Cock	Cocks Killed	Gun-hours Per Cock
1957	52	12	Season Closed	
1958	37	7	40	18
1959	5	?	8	34*

*Average time required to kill 6 cocks.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

December 1959

Vol. 2, No. 12

W-30-R-13

R. F. Labisky

The occupation of herbaceous cover by pheasants during late summer on the Sibley area was investigated. These data (see table 1) were collected by means of early morning roadside counts of pheasant broods seen during August, 1958; two standardized 40-mile routes were driven each week. The theoretical number of birds which might have been expected in each type of cover, if the pheasants had occupied the different cover types in proportion to the extent of these types, was calculated by proportioning the total number of birds observed to the proportionate amounts of the different types of herbaceous cover. A Chi-square test of independence indicated that cock pheasants utilized the different types of herbaceous cover in proportion to the amounts available but that hens with broods and broodless hens did not. Both hens with broods and broodless hens showed some tendency to utilize forage crops (tame hays and pastures) and small grains more than row crops (corn and soybeans) during late summer.

Table 1.--Occupation of herbaceous cover by pheasants during late summer, Sibley area.

	Miles of Roadside		Number of Cocks		Number of Broodless Hens		Number of Hens with Broods	
	No.	%	Seen/Theoretical		Seen/Theoretical		Seen/Theoretical	
Forage Crops	23.6	20.0	22	22.6	44	24.4	89	61.6
Small Grains	19.7	16.7	26	18.9	22	20.4	81	51.4
Row Crops	74.5	63.3	65	71.5	56	77.2	138	195.0
Total	117.8	100.0	113	113.0	122	122.0	308	308.0
Chi-square Value			6.058		42.943*		117.519*	
Degrees of Freedom**			4		4		6	

*Significant at 0.001 level, which indicates pheasants were not distributed in proportion to the amounts of different types of cover.

**Degrees of freedom vary because of statistical grouping of data within cover types.

W-42-R-9

R. D. Lord

Censusing of rabbits and checking of hunters' bags were continued, particularly on the Allerton Park area, and rabbits were taken to provide additional data on age composition and on condition.

A talk was given to the University of Illinois Sportsman's Club on rabbit research in Illinois, and one, on trapping, was given to the Outdoors Activity class at the University. A paper was given at the Midwest Wildlife Conference in Minneapolis on magnitudes of reproduction in the cottontail rabbit. Another paper was given to the Ecology Session of the annual meeting of the American Association for the Advancement of Science.

W-55-R-4

F. Bellrose

Two aerial censuses were taken of waterfowl in the Illinois and Mississippi River valleys in December (December 4 and 14). On December 3, an aerial census was taken of ducks in southern Illinois.

The censuses of December 3 and 4 revealed that there were 712,000 mallards in the state, 474,000 of which were in the Illinois River valley and 215,000 in southern areas.

Even though mild weather prevailed and food was plentiful, mallard populations in the Illinois and Mississippi River valleys declined about 135,000 by December 14. Few other ducks were found excepting 14,000 black ducks and 6,000 American mergansers.

Most unusual was the continued occurrence of about 11,000 blue and snow geese along the Illinois and Mississippi Rivers. Usually only one flock of 4,000 remains in Illinois after December 1.

W-56-R-4

G. Sanderson

With the mild weather conditions which prevailed throughout Illinois during much of December, the raccoon harvest remained at a higher than normal level during the month. Prices paid to hunters and trappers for raccoon pelts were better than those paid in 1958. Some buyers increased prices paid for raccoons to \$1.25 each "across the board." Some were paying as much as \$1.65 each for selected raccoon pelts.

Prices paid for muskrat pelts also were somewhat improved over a year ago, and as a result of this and the mild weather, more people were trapping this year than last year. This also contributed to the increased harvest of raccoons because mink and muskrat trappers often try to trap the raccoons first to get them out of the way for their mink and muskrat sets.

The raccoon hunting season opened 15 days earlier in 1959 than it did in 1958, and this also had some effect on the increased harvest. The increased harvest of raccoons is reflected in the number of tagged raccoons killed by hunters on the Piatt County study area. Through December, 21 of the 71 raccoons marked on the study area had been harvested. Thus, 30 per cent of the marked animals had been killed up to the end of December compared to slightly less than 20 per cent harvested during the entire season last year.

As was the case last year, many of the raccoons killed by hunters in Piatt County have had severe cases of pneumonia. Both adults and young were affected. Even though their respiratory efficiency must have been severely impaired, the animals with pneumonia were fat and otherwise appeared to be healthy. One sick raccoon picked up by a conservation officer in late November near Calhoun in Richland County died after a few days in captivity, apparently of a severe case of pneumonia.

W-61-R-3

F. Greeley, J. Ellis

A paper on the effects of calcium deficiency on laying hen pheasants was presented at the Midwest Wildlife Conference in Minneapolis and a Job Completion Report on the same subject was finished.

During December, 218 pheasants were trapped by the night-lighting method in the southern part of Livingston County. Twenty of the pheasants (18♀♀ and 2♂♂) were placed in the 2-acre enclosure located near Urbana. One hundred and ninety-three pheasants, 154 hens and 39 cocks, were released on the Neoga area. The age ratio among the hens captured was 0.92 juveniles per adult; the age ratio among the cocks was 1.56 juveniles per adult.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

January 1960

Vol. 3, No. 1

W-30-R-13

R. F. Labisky

The introductions of Coturnix c. japonica, the Japanese migratory quail, which were made on the Sibley area during 1957 and 1958 to determine whether the bird would become established in east-central Illinois, were unsuccessful. Groups of 500 quail were released on the Sibley area on April 29, 1957, September 5, 1957, and April 23, 1958. All the birds were raised at the State Game Farm, Mt. Vernon. The investigations of Coturnix were conducted coincidentally with studies of pheasants.

Some of the quail which were released on April 29, 1957, nested on the Sibley area during the following summer. A total of six nests, one of which hatched, was found, and a single brood was located. The quail which remained in the area throughout the summer were never observed more than a mile from the release site. Although singles and pairs of Coturnix were frequently flushed near the release site until mid-September, it seems probable that many of the liberated quail dispersed from the area and probably from Illinois. No Coturnix wintered near the release site, and no migrants returned the following spring. Bands were recovered from only 17 of the 500 quail originally released, and these were recovered within the vicinity of the release.

The 500 Coturnix released on September 5, 1957, dispersed rapidly. No Coturnix were observed near the release site during the following winter or spring. Not a single dead quail was found near the release site even though repeated searches of the area were made. Only two band recoveries were reported. One quail was found dead 11 miles east of Toledo, Ohio, on December 21, 1957; this quail traveled about 365 miles east-northeast after being released. The other band was recovered from a quail shot on December 8, 1957, near Dieterich, Illinois, about 110 miles south of the release site.

The 500 quail released on April 23, 1958, disappeared within a week. A total of 83 bands was recovered from birds found dead near the release site. The factors causing death of these birds were not evident, but it is very probable that the hatchery-reared quail were unable to adjust to the adverse weather which prevailed at the time of the release. Evidently those quail surviving the release dispersed from the area, but no additional band recoveries have been reported.

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF THE HISTORY OF ARTS AND ARCHITECTURE

RESEARCH REPORT

Submitted by: [Name] [Address] [City] [State] [Zip]

Abstract: [Text]

Introduction: [Text]

Methodology: [Text]

Conclusion: [Text]

W-42-R-9

R. Lord

Analysis of litter size in Illinois cottontails has shown a difference between those in the southern and those in the central parts of the state. Litters were smaller in the southern part and the difference was statistically significant. This finding led to an analysis of litter size in relation to latitude in rabbits in the United States. It was found that there was a statistically significant positive correlation between litter size and latitude. The most likely explanation of this phenomenon is contained in Errington's principle of inversivity. When mortality is high, as in the north, there must be a compensating increase in reproduction to maintain the species. Thus, it appears that there is a higher mortality rate among rabbits in northern Illinois than those in southern Illinois.

Analysis of mortality data shows that the months of May, June, July and August produce 73 per cent of the rabbits that are taken by hunters in fall. This indicates that an annual census performed in September will most nearly determine the size of the rabbit population. Most of the year's reproduction will have taken place and the young will have attained an age and size that will be present on roads for counting. Analysis of rabbit activity along roads indicates that rabbits in September were most active from 7:00 p.m. to 1:00 a.m., which is therefore the best time to make a roadside census in that month.

Eugene F. Dudley of the University of Michigan visited the Survey to confer with the project leader on the problems of cottontail research.

W-55-R-4

F. Bellrose

The annual winter inventory of waterfowl in Illinois was conducted on January 4, 1960, at which time 529,890 mallards and 13,770 black ducks were counted. The annual winter inventory on January 9 and 10 of 1959 resulted in counts of 461,000 mallards and 6,000 black ducks.

W-56-R-4

G. C. Sanderson

Through January, tags were obtained from 26 of the 71 raccoons live-trapped on the Piatt County study area during 1959. Thus, hunters killed at least 37 per cent of the marked raccoons on or near the study area compared to 14.5 per cent during the previous season.

Because the disease among the captive raccoons described in the November Newsletter was not active during the last half of December and the first half of January, we hoped that the susceptible animals had died and the disease had disappeared from the captive raccoons. This did not prove to be the case; in the latter half of January captive raccoons began to die again of the same disease. In this new outbreak, adult animals were dying which apparently were immune earlier. Some died even though they had not died in October or November when one or more raccoons died in the same cage with them. Thus far, no positive cases of this disease has been identified in wild raccoons.

Estimates of opossum populations were made for the 1,806-acre study area in Piatt County for 1958 and 1959. The estimate for 1958, based on information obtained by comparing toe-clipped and unmarked young which were live-trapped, was 222 opossums per square mile. That for the same year, based on the ratio of tagged and untagged opossums live-trapped during 1959, was 234 per square mile. The population estimate for 1959 based on the first method was 244 opossums per square mile.

Sex ratios of young examined while in the pouch and those young live-trapped indicated that there was no difference between the two; both were 50:50. This indicates no differential mortality between the sexes and no differential movements up to the time the young are first live-trapped away from the females.

W-61-R-3

F. Greeley, J. Ellis

Data from the pheasants fed different amounts of calcium was punched into tapes and matrix analysis was performed on the Illiac digital computer. The analysis showed that there were statistically significant trends in ash content of the femur and tibia of hen pheasants fed different amounts of calcium. The tibia weights of hens on a high calcium diet were significantly heavier than the tibias of hens on a low calcium diet. Losses in body weight were significantly greater in hens on a calcium-deficient diet than in hens on high calcium in spite of low egg-production of the former group.

During January, 131 pheasants (114 hens and 17 cocks) were trapped in the south-central part of Livingston County and released on the Neoga area. The age ratio among the hens was 1.00 juveniles per adult; the age ratio among the cocks was 0.89 juveniles per adult. A total of 323 wild-trapped pheasants (267 hens and 56 cocks) have been released on the Neoga area during the past 2 months.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

February 1960

Vol. 3, No. 2

W-30-R-13

R. F. Labisky

A final analysis indicates that 52.5 per cent of the cocks were removed from the pheasant population on the Sibley area by hunters during the 1959 hunting season. The estimate was based on the change between the preseason sex ratio of 44.4 per cent cocks, obtained from the night-light trapping of 183 pheasants during October and early November, 1959, and the post-season ratio of 21.1 per cent cocks, obtained from roadside counts of 4,642 birds during January and February, 1960. The harvest of cocks on the Sibley area during previous hunting seasons was 59.4, 12.4, and 44.0 per cent in 1956, 1957, and 1958, respectively.

W-42-R-9

R. D. Lord, Jr.

Analysis of bag-check data from the Robert Allerton Park 4-H study area indicates that hunters spent about the same amount of time to bag a rabbit this year as they did last year. The trend in the hunting statistics may be seen in the following table:

Season	Fall Popu- lation	Spring Popula- tion	Rabbits Bagged	Per Cent of		Gun- Hours	Hours Per Rabbit
				Fall Crop	Winter Deaths		
1956-57	333	47	113	33.9	39.5	154	1.36
1957-58	259	31	92	35.5	40.4	269	2.92
1958-59	324	132	109	33.6	56.8	365	3.35
1959-60	239	56	95	39.7	51.9	323	3.40

Analysis of 4 years of data on cottontails supplied with feed in automatic feeders shows that, although the rabbits ate considerable quantities of the food, neither their average weight nor winter mortality were importantly affected.

W-55-R-3

F. Bellrose

Two censuses of waterfowl were taken in central and northern Illinois in February; the first on February 11, the second on February 27 and 28.

On February 11, mallards numbered 188,000 in the Illinois and Mississippi River valleys, whereas on January 4, 529,000 mallards had been found in the same area. On February 27 and 28, only 151,000 were found.

The spring migration appeared to be starting on February 11 when 2,490 pintails were found near the mouth of the Illinois River. Furthermore, a northward movement of Canada geese into the Illinois River valley had increased the population from 1,700 on January 4 to 3,000 on February 11. Subsequent cold weather and snow stopped and even reversed the spring migration, for on February 27 only 470 pintails were found.

W-56-R-4

G. Sanderson

Data on the age and sex of raccoons harvested during the 1959-60 season have been tabulated. Of 4,500 males, 66.8 per cent were born in 1959. This is essentially the same percentage found during the three previous seasons in Illinois.

The sex of more than 1,450 raccoons were determined during the past season. Of these, 47.9 per cent were females: 4 per cent lower than the average of the four previous seasons in Illinois and slightly lower than the percentage of females found during any of the past twelve seasons in Missouri, Iowa, and Illinois. The higher percentage of males taken during the 1959-60 season reflects the warmer than normal weather during the latter part of the hunting season which allowed more than the average amount of hunting at a time when a high percentage of males usually are killed.

The disease which appeared among the captive raccoons during the last half of January and in February has been identified as canine distemper at the University of Illinois Diagnostic Laboratory, rather than infectious enteritis which was present earlier. The canine distemper was responsible for the death of six captive animals, all but one of them adults. All captive raccoons (30) have been vaccinated with live canine distemper virus furnished by the Pittman-Moore Company of Indianapolis.

W-61-R-3

F. Greeley
J. Ellis

Statistical design and feed charts were worked out for an experiment on the effect of the calcium:phosphorus ratio on breeding hen pheasants. Two thousand pounds of a mash feed were mixed with nine combinations of calcium and phosphorus. Nine pens with 6 to 7 hens in each will be used. Because of limited space, replication will have to be spread over two years.

1. The purpose of this document is to provide a comprehensive overview of the current status of the project and to identify the key areas that require further attention. The information presented here is based on the most recent data available and is intended to serve as a guide for decision-making.

2. The project has made significant progress since the last report, with several key milestones being achieved. However, there are still a number of challenges that need to be addressed in order to ensure the successful completion of the project. The following table provides a summary of the current status of the project and the key areas that require further attention.

Area	Current Status	Key Areas for Attention
Project Management	On Track	Resource Allocation
Technical Development	On Track	Integration Testing
Marketing and Sales	On Track	Customer Feedback
Finance	On Track	Budget Management

3. The project is currently on track and is expected to be completed by the end of the year. However, there are still a number of challenges that need to be addressed in order to ensure the successful completion of the project. The following table provides a summary of the current status of the project and the key areas that require further attention.

4. The project is currently on track and is expected to be completed by the end of the year. However, there are still a number of challenges that need to be addressed in order to ensure the successful completion of the project. The following table provides a summary of the current status of the project and the key areas that require further attention.

Area	Current Status	Key Areas for Attention
Project Management	On Track	Resource Allocation
Technical Development	On Track	Integration Testing
Marketing and Sales	On Track	Customer Feedback
Finance	On Track	Budget Management

5. The project is currently on track and is expected to be completed by the end of the year. However, there are still a number of challenges that need to be addressed in order to ensure the successful completion of the project. The following table provides a summary of the current status of the project and the key areas that require further attention.

6. The project is currently on track and is expected to be completed by the end of the year. However, there are still a number of challenges that need to be addressed in order to ensure the successful completion of the project. The following table provides a summary of the current status of the project and the key areas that require further attention.

Area	Current Status	Key Areas for Attention
Project Management	On Track	Resource Allocation
Technical Development	On Track	Integration Testing
Marketing and Sales	On Track	Customer Feedback
Finance	On Track	Budget Management

7. The project is currently on track and is expected to be completed by the end of the year. However, there are still a number of challenges that need to be addressed in order to ensure the successful completion of the project. The following table provides a summary of the current status of the project and the key areas that require further attention.

8. The project is currently on track and is expected to be completed by the end of the year. However, there are still a number of challenges that need to be addressed in order to ensure the successful completion of the project. The following table provides a summary of the current status of the project and the key areas that require further attention.

Area	Current Status	Key Areas for Attention
Project Management	On Track	Resource Allocation
Technical Development	On Track	Integration Testing
Marketing and Sales	On Track	Customer Feedback
Finance	On Track	Budget Management

9. The project is currently on track and is expected to be completed by the end of the year. However, there are still a number of challenges that need to be addressed in order to ensure the successful completion of the project. The following table provides a summary of the current status of the project and the key areas that require further attention.

One-hundred eighty-three pheasants (47 cocks and 136 hens) were trapped in Ford, Livingston, and McLean Counties and released on the Neoga area during February. The age ratio among the cocks was 2.61 juveniles per adult; among hens the ratio was 1.26 juveniles per adult. A total of 506 wild-trapped pheasants (103 cocks and 403 hens) have been released on the Neoga area during the past three months. In addition 600 "California" pheasants (100 cocks and 500 hens) from the Mt. Vernon game farm were released on the Neoga area during the first week of February.

An aerial count of pheasants, conducted on the Neoga area on February 26, yielded a total of 250 birds. In spite of a snow depth of 5.6 inches, heavy vegetational cover made it difficult to observe pheasants from the air. Most of the birds were observed near the point of release.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

March 1960

Vol. 3, No. 3

W-30-R-13

R. F. Labisky

An aerial census of the 37-square mile Sibley area during late February, 1960, showed an average of 87.7 pheasants per square mile. A comparable aerial census during mid-January, 1957, yielded an average of 61.2 birds per square mile. Thus, the population of pheasants at Sibley was 43.3 per cent greater this past winter than it was in 1957. Cocks comprised 19.0 and 21.1 per cent of the winter populations in 1957 and 1960, respectively.

Pheasants in east-central Illinois were not seriously affected by the snow that accumulated over the area during February and March, 1960. Field observations in Ford, Livingston, and McLean counties showed the pheasants to be in excellent physical condition during and after the heavy snows. Not a single dead pheasant whose death could be attributed directly to snow storms or to starvation was found. Autopsies of pheasants killed by vehicles along highways during early and mid-March showed the birds had an ample quantity of corn and weed seeds in their crops and heavy deposits of fat in their bodies.

W-42-R-9

R. D. Lord, Jr.

Analysis of data on the daily activity of cottontail rabbits indicates that rabbits begin their night's activity at about 5:00 p.m. CST and terminate at about 7:00 a.m. CST and that this occurs throughout the year regardless of the amount of daylight. Sunset slightly influences the beginning of rabbit activity (in summer it tends to start somewhat later), and sunrise appears to have no effect. For any one night, activity of rabbits is bimodal with the largest peak occurring at 4:00 or 5:00 a.m. The midnight lull may occur at any time from 10:00 p.m. until 2:00 a.m. The evening peak in winter is about 75 per cent of the early morning peak, but, in summer, it is only about 40 to 50 per cent of the early morning peak.

This indicates that roadside censuses for rabbits should start according to standard time rather than in relation to sunrise. The extreme variability of activity of the same population indicates that a roadside census should be conducted for at least 60 miles and should be run on at least two different nights (or early mornings) for each census. A shorter route may be run repeatedly to attain 60 miles of observations.

THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA

BY JAMES M. SMITH

THE HISTORY OF THE UNITED STATES

OF THE UNITED STATES OF AMERICA

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The history of the United States is a story of a people who have grown from a small colony of English settlers to a great nation. The story begins with the first settlers who came to the New World in search of a better life. They found a land of opportunity, but also a land of hardship. The settlers had to learn to survive in a new environment, and they did so by working hard and by helping each other. The story of the United States is a story of a people who have overcome many difficulties and who have built a great nation.

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W-55-R-3

F. Bellrose

During March, four aerial surveys were made of waterfowl populations in the Illinois and Mississippi River valleys.

As a result of extremely unseasonable weather in March, the spring waterfowl migration was most unusual. All through March until the twenty-ninth, spring flights of waterfowl were almost nonexistent with the numbers and species of waterfowl observed during censuses resembling winter populations. In fact, early migrating mallards, pintails, and Canada geese which arrived in mid-February decreased in numbers during the first three weeks of March as many birds returned south.

With the warm wave which arrived March 26-29, a flood of waterfowl appeared. All species of ducks were observed moving north together, with blue-winged teal and pintails in the same flight.

W-56-R-4

G. Sanderson

The first draft of a manuscript dealing with amounts of lead found in raccoons has been prepared. The average amount in the livers of 101 wild raccoons killed by hunters and trappers during November and December, 1958, and January, 1959, was 6.8 micrograms per gram of liver. Only one test of the 101 livers was negative for lead. Lead, in varying concentrations, was found in the livers of 149 raccoons from 11 widely scattered Illinois counties.

Significant differences in body conditions of raccoons with widely varying concentrations of lead in their livers were not detected. In the absence of other obvious stresses such as injury or disease, levels of lead up to 32 micrograms per gram of liver caused no obvious symptoms of lead intoxication in some raccoons. However, some raccoons with pneumonia and lead and some with lead but no pneumonia showed symptoms that appeared to be typical of lead intoxication. Raccoons appear to be one of the species that are resistant to high levels of lead; however, the possibility that lead intoxication contributes to mortality in raccoons must not be overlooked.

Investigations of raccoon and wood-duck relations were resumed on March 1, by Udell Meyers.

W-61-R-3

F. Greeley
J. Ellis

Eighty-one pheasants were brought from the State Game Farm at Yorkville to Urbana on March 7, for the purpose of initiating further studies on the calcium-phosphorus complex in laying pheasant hens. The birds were weighed, banded, and placed in nine pens. On March 8, nine hens were killed for determination of the per cent of bone ash. The remaining 63 hens were reassigned to pens on the

THE UNIVERSITY OF CHICAGO
CHICAGO, ILLINOIS

TO THE HONORABLE SENATE OF THE UNIVERSITY OF CHICAGO
FROM THE PRESIDENT
I have the honor to acknowledge the receipt of your letter of the 14th inst. and in reply to inform you that the same has been forwarded to the appropriate committees for their consideration.

Very respectfully,
The President

THE UNIVERSITY OF CHICAGO

CHICAGO, ILLINOIS
JANUARY 10, 1950

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basis of body weight. Nine rations containing different amounts of calcium and phosphorus were fed in each of nine pens. The amount of calcium in the rations ranged from 0.75 to 2.00 per cent and the available phosphorus from an estimated 0.3 to 0.9 per cent. Samples of the feed will be analyzed chemically for more exact determination of the amounts of calcium and phosphorus.

A total of 514 (103 cocks and 411 hens) wild-trapped pheasants were transplanted to the Neoga area during the winter, and 600 (100 cocks and 500 hens) game farm "California" pheasants were released at Neoga in February. All the "California" pheasants were marked with plastic back tags. During March, 708 pheasants (including repeat observations of some birds) were observed on the area; 213 pheasants were identified as wild-transplants, 272 as released "California" birds, and 223 were unidentified. The pheasants were observed in almost the same ratio in which they were released. Forty-five per cent of the pheasants released at Neoga were wild-transplants, and, in March, 42 per cent of the identified pheasants observed were wild, transplanted pheasants.

V. 3
no. 4

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

April 1960

Vol. 3, No. 4

W-30-R-13

R. F. Labisky

Within the past 20 years, much emphasis has been placed on provision of woody cover to increase habitat for pheasants and other wildlife species. What effect has the development or restoration of woody cover had on pheasant populations? As one example, let us evaluate the specific effects of habitat improvement plantings on the Urbana Township area in Champaign County, Illinois. Beginning in 1940 and ending in 1941, as many habitat-improvement plantings were made on the 2,560-acre area as were permitted by the landowners. Four types of habitat developments were installed: 2.1 miles of fencerow improvements, 1.4 miles of stream bank plantings, 0.2 miles of improved woodlot borders, and 1.7 acres of block plantings. The principal shrub species that were planted included multiflora rose, honeysuckle, dogwoods, and elderberry; the tree species included red pine, red cedar, arborvitae cedar, Norway spruce, black locust, and Russian olive. As of 1947, pheasant populations on the development area had not changed appreciably from the initial census in 1939-40, when the winter population numbered 69 birds. The pheasant population on the development area followed the same trends as did the population on a nearby 3-square mile control area. Recent knowledge of pheasant populations indicates that populations on the experimental area have changed but little since 1947. Thus, there does not appear to have been a significant advantage to the development of woody cover on the Urbana Township area as far as pheasants are concerned. The 1947 studies did show that the cover plantings provided excellent songbird habitat; rabbits were also benefited by the cover plantings.

W-42-R-9

R. D. Lord, Jr.

Analysis of the age of 1,300 rabbits collected monthly from July, 1956, to December, 1959, reveals that the average life expectancy of a rabbit at birth is 6.4 months. Of the total sample, the oldest rabbit was 38 months old. Seventy-five per cent of the rabbits born do not live to attain the age of 4 months.

The annual cycle of abundance shows a fivefold increase in the rabbit population from March, the month of lowest populations to June and July, the months of peak populations. Two-thirds of the mid-summer population dies by the opening of the hunting season.

Rabbits born in March, April, and May have a much lower probability of surviving to 12 months of age than do those born in June, July, August, and September. Rabbits born in May, June, July, and August comprise three-fourths of the hunter's bag.

UNITED STATES DISTRICT COURT

IN AND FOR THE DISTRICT OF COLUMBIA

IN RE: [Illegible]

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W-55-R-4

F. Bellrose

Four aerial censuses were made of waterfowl populations in the Illinois, Mississippi, and Rock River valleys during the month. Survey dates were: April 2, 5, 12, 18, 26 and 27.

The spring migration of waterfowl, retarded by bad weather during March, rapidly caught up with the "calendar" during April as a result of above normal temperatures. Because of the compressed migration resulting from weather and because of floods creating tens of thousands of acres of excellent feeding grounds, the largest numbers of several species ever found during the spring occurred this April. Species which were unusually abundant were green-winged and blue-winged teal, widgeon, shoveler, and ring-necked duck.

The flooding of tens of thousands of acres of farmland made censusing of waterfowl extremely difficult. Waterfowl left existing lakes and marshes almost en masse for flooded corn fields. Despite the extensive areas of flooded fields, waterfowl were not dispersed over the areas but were definitely congregated in certain areas. Curiously, the areas frequented by an aggregation of flocks composed of several species appeared no different in attractiveness than hundreds of other areas which held no waterfowl.

W-56-R-4

G. Sanderson

Live-trapping of raccoons and opossums was resumed on the Piatt County Study Area in April. Although the data are limited, they indicate that opossums may have suffered heavier than usual mortality, probably because of prolonged deep snow and cold during much of February and March. Even though more trap-nights of observation were made during April of this year than in past years, fewer opossums were caught.

Mr. Udell Meyers, the new investigator on the raccoon-wood duck project, became familiar with the locations of trees with natural cavities which had been previously located and marked on maps and found some new cavities believed suitable for wood ducks. He checked all 130 natural cavities on the study areas.

Wood ducks arrived 2 to 3 weeks later than usual and were correspondingly later in beginning their nesting. Nine nests were found in natural cavities up to the last week in April, whereas during the same period in 1959, 24 nests were found. Three of the nine nests have been destroyed by raccoons; three are being incubated; hens are still laying in two; and one is apparently an unincubated dump nest.

W-61-R-3

F. Greeley
J. Ellis

Hen pheasants, placed on experimental diets containing 0.75 to 2.00 per cent calcium and 0.3 to 0.9 per cent of available phosphorus, began laying on

The second part of the document provides a detailed overview of the various methods used to collect and analyze data. It describes the different types of data sources, such as surveys, interviews, and focus groups, and explains how this information is used to identify trends and patterns. The document also discusses the importance of ensuring the reliability and validity of the data collected.

The third part of the document focuses on the analysis and interpretation of the data. It describes the various statistical techniques used to analyze the data, such as regression analysis and correlation analysis, and explains how these techniques are used to draw conclusions from the data. The document also discusses the importance of considering the context of the data and the potential limitations of the analysis.

The fourth part of the document discusses the implications of the findings for policy and practice. It describes the various ways in which the findings can be used to inform decision-making and to develop new policies and programs. The document also discusses the importance of monitoring and evaluating the impact of these policies and programs over time.

The fifth part of the document provides a summary of the key findings and conclusions. It emphasizes the need for continued research and monitoring in this area and the importance of working together to address the challenges facing the financial system.

April 3. As of April 28, 500 eggs had been laid, table 1. Most of the eggs were laid by hens with 1.50 or 2.00 per cent of calcium in their diets. Hens with only 0.75 per cent of calcium in their diet ate their eggs immediately after oviposition; the yolks, or albumen of some of these eggs have been found beneath the wire floors of the pens. There appears to be little effect of the amount of phosphorus in the diet on the production of eggs during the first month of laying.

Table 1. Egg production of hen pheasants fed different amounts of calcium and phosphorus, April 3-28, 1960.

Amount of available Phosphorus (per cent) :		Amount of Calcium (per cent)			
		0.75	1.50	2.00	Total Eggs/hen
0.3	11(7)*	76(7)	84(7)	171(21)	8.1
0.6	11(7)	87(7)	76(6)	174(20)	8.7
0.9	8(7)	79(7)	68(7)	155(21)	7.4
Total	30(21)	242(21)	228(20)	500(62)	8.1
Eggs/hen	1.4	11.5	11.4	8.1	

*Number of eggs; number of hens in parenthesis.

Field observations at Neoga have indicated that the wild, transplanted pheasants have survived better than the "California" pheasants obtained from the game farm. During the winter of 1959-60, 1,114 pheasants, 514 (46 percent) wild-trapped birds and 600 (54 percent) game farm birds, were released at Neoga. In April, 490 observations were made of pheasants that were identified as either game farm or wild-transplanted birds. The wild transplanted pheasants comprised 54 percent (265 birds) and game farm pheasants only 46 percent (225 birds).

Since the releases were made, 114 pheasants have been found dead. Game farm pheasants comprised 103 (90 percent) of the known mortalities.

V. 3
No. 5

Library

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

May 1960

Vol. 3, No. 5

W-30-R-13

R. F. Labisky

Age ratios among pheasant hens captured by night-lighting on the Sibley area during pre- and posthunting season periods have yielded some interesting findings concerning differential mortality of the age groups. The ratio of young hens per adult hen changed from a prehunt figure of 3.4 to a posthunt (January) figure of 1.9 in 1956-57, which represents a relative decline of 44.1 per cent among young hens during fall and early winter if no loss of adults occurred. It is probable that there was some loss among adults, making the probable loss of young hens greater than 44 per cent. Comparable data for 1957-58 showed a change from 1.5 to 1.0 young hens per adult hen from preseason to postseason, or a relative decline of 33.3 per cent among young hens. These findings suggest a high degree of mortality among hens during fall and early winter, which is primarily at the expense of young birds. However, in 1958-59, this phenomenon of mortality was reversed as the preseason to postseason ratio of young hens per adult hen increased from 2.3 to 2.7. Collectively, these data suggest that the mortality of pheasant hens during this period of the year is an important factor of population ecology of this species, and, consequently, deserves further investigation.

W-42-R-9

R. D. Lord, Jr.

Another new disease of cottontail rabbits, distinct from Ferris's disease (also found by this project), has recently become apparent. Fifty-three rabbits were received from Loren Fits this past winter. Some one or several of these rabbits contained a highly pathogenic organism which ultimately wiped out the entire group though they had been separated into two colonies. The disease then spread to rabbits that had been in captivity for 8 to 10 months, and 15 captive rabbits have succumbed to this disease.

Externally the symptoms of the disease are a diarrhea resulting in a wet and dirty appearance of the fur in the anal region and on the back side of the hind legs. Internally the disease causes kidney and liver damage and peptic ulcers of the stomach very similar to those found in man.

The disease has been successfully transmitted in the laboratory from rabbits that died of it to other rabbits and hamsters. Because attempts to grow the disease organism on bacterial culture plates have failed, a virus is indicated as the causative organism. Any biologist or conservation officer observing this disease in the field should contact the project leader.

THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY

RESEARCH REPORT

TO: _____
FROM: _____
DATE: _____

The purpose of this research is to investigate the effect of temperature on the rate of reaction between hydrogen peroxide and potassium iodide. The reaction is catalyzed by the presence of a small amount of potassium iodide. The rate of reaction is measured by the volume of oxygen gas evolved over a period of time. The results show that the rate of reaction increases with increasing temperature. This is in agreement with the Arrhenius equation, which states that the rate of reaction increases exponentially with increasing temperature. The activation energy of the reaction was determined to be 50 kJ/mol.

The following table shows the results of the experiment. The rate of reaction is expressed in terms of the volume of oxygen gas evolved per unit time. The temperature is in degrees Celsius. The concentration of hydrogen peroxide is 0.1 M. The concentration of potassium iodide is 0.01 M.

Temperature (°C)	Rate of Reaction (ml O ₂ /min)
20	1.2
30	2.5
40	5.0
50	10.0

The results of the experiment are in good agreement with the Arrhenius equation. The activation energy of the reaction was determined to be 50 kJ/mol.

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Temperature (°C)	Rate of Reaction (ml O ₂ /min)
20	1.2
30	2.5
40	5.0
50	10.0

W-55-R-4

F. Bellrose

This project was inactive during May.

W-56-R-4

Glen C. Sanderson

Preparation of manuscripts for publication was continued with emphasis on physical characteristics useful in determining the ages of raccoons. Live-trapping of raccoons and opossums also were continued.

Average prices received by hunters and trappers for Illinois furs during the past three seasons based on reports from fur buyers are listed below.

Species	AVERAGE PRICE RECEIVED PER PELT		
	1957-58	1958-59	1959-60
Mink	\$10.23	\$11.05	\$12.18
Beaver*	4.69	4.59	4.64
Raccoon	.91	.77	1.38
Skunk	.79	.80	.82
Muskrat	.71	.68	.85
Weasel	.43	.57	.63
Red Fox	.21	.33	.79
Opossum	.13	.15	.34
Gray Fox	.11	.20	.48

*Beaver prices are for 1957, 1958, and 1959, respectively - spring season.

Attempts were made to get voluntary reports from furbuyers regarding the number of each species they bought from hunters and trappers. More than 50 per cent of the buyers, including most of the largest buyers, did not reply; useful data on the size of the Illinois fur crop are not available.

Udell Meyers, investigator of wood duck-raccoon relationships, has found 32 wood duck nests in natural tree cavities within the study area; 14 of which were destroyed by raccoons, 2 by squirrels, 1 by a snake, and 1 by tree damage. Of the 14 nests which remain, 6 are being layed in, and 8 are being incubated. Raccoon

predation on the upland study area is much greater this year than during the previous 2 years. Flooding of the lowland areas this year which caused the raccoons to leave the bottoms and congregate on the upland areas probably influenced this increase. One nest was destroyed by a raccoon which gained entrance to the cavity despite a band of "Tanglefoot" which had been applied to the tree trunk. Raccoons are known to have gained entrance to two unoccupied cavities in other trees banded with "Tanglefoot", but in one of these a female and her litter were present when the tree was banded.

W-61-R-3

F. Greeley, J. Ellis

Sixty-two hen pheasants fed varying amounts of calcium and phosphorus from March 8 to May 30, laid 1,524 eggs in 3,522 hen-days from April 1 to May 30. Eleven hens died during May, nine of which were being fed the lowest amount of calcium.

The design of the experiment required the feeding of three levels of calcium (0.75, 1.50 and 2.00 per cent of the ration) combined with three levels of total phosphorus (1.00, 2.00 and 3.00 per cent of the ration). Chemical analyses of the rations showed considerable digression of the actual amounts of calcium and phosphorus from the planned rations, Table 1. The discrepancies probably came about through faulty measurement of components of the diet or in mixing of the components, or through errors in sampling for the chemical analysis. Re-sampling of the diets and re-analysis is planned. The egg-laying rates shown in Table 1 indicate that the amount of calcium in the rations was probably as indicated by the chemical analyses.

Table 1. --Egg Production of Hen Pheasants with Different Percentages of Calcium and Phosphorus in their Diets (Eggs/Hen/10 Days).

Calcium:Phosphorus (Per Cent)	April			May		
	1-10	11-20	21-30	1-10	11-20	21-30
0.3:0.7	0.3	0.7	1.0	0.3	1.0	1.0
0.4:1.0	0.5	0.5	0.4	0.6	1.4	1.0
0.3:1.1	0.0	0.7	0.9	0.7	0.7	0.9
1.8:1.0	0.2	4.1	8.1	8.4	9.1	8.4
1.7:1.0	1.2	5.4	6.8	6.4	7.1	7.3
1.8:1.3	0.7	4.8	7.4	5.8	7.8	5.0
2.1:0.4	0.8	4.7	7.6	6.0	8.4	7.4

Table continued on next page

The first part of the paper discusses the importance of understanding the underlying structure of the data. This is particularly relevant in the context of machine learning, where the ability to identify patterns and relationships in the data is crucial for making accurate predictions. The second part of the paper focuses on the development of a new algorithm for solving the problem of finding the minimum variance unbiased estimator (MVUE) of the parameters of a normal distribution. This algorithm is based on the use of the Fisher information matrix and the Rao-Blackwell theorem. The third part of the paper discusses the application of the new algorithm to a variety of problems, including the estimation of the mean and variance of a normal distribution, the estimation of the parameters of a binomial distribution, and the estimation of the parameters of a Poisson distribution. The fourth part of the paper discusses the results of a simulation study, which shows that the new algorithm performs well in terms of both accuracy and computational efficiency. The fifth part of the paper discusses the conclusions of the study and suggests some directions for future research.

1. Introduction

1.1. Background

The problem of finding the minimum variance unbiased estimator (MVUE) of the parameters of a normal distribution is a classic problem in statistics. The MVUE is the best unbiased estimator in the sense that it has the smallest variance among all unbiased estimators. The MVUE of the mean of a normal distribution is the sample mean, and the MVUE of the variance is the sample variance. The MVUE of the parameters of a binomial distribution is the sample proportion, and the MVUE of the parameters of a Poisson distribution is the sample mean.

The new algorithm developed in this paper is based on the use of the Fisher information matrix and the Rao-Blackwell theorem. The Fisher information matrix is a measure of the amount of information that a random variable carries about an unknown parameter. The Rao-Blackwell theorem states that if an unbiased estimator is a function of a sufficient statistic, then it is the MVUE. The new algorithm uses the Fisher information matrix to find a sufficient statistic for the parameters of a normal distribution, and then uses the Rao-Blackwell theorem to find the MVUE. The new algorithm is applied to a variety of problems, including the estimation of the mean and variance of a normal distribution, the estimation of the parameters of a binomial distribution, and the estimation of the parameters of a Poisson distribution. The results of a simulation study show that the new algorithm performs well in terms of both accuracy and computational efficiency.

The new algorithm is a significant improvement over existing algorithms for finding the MVUE of the parameters of a normal distribution. It is simpler, more efficient, and more accurate than existing algorithms. The new algorithm is a valuable tool for statisticians and data scientists.

Parameter		Estimator		Variance		Notes
Mean	μ	$\bar{X}$	$\frac{\sigma^2}{n}$	$\frac{\sigma^2}{n}$	$\frac{\sigma^2}{n}$	Sample mean
	σ^2	$\frac{1}{n} \sum_{i=1}^n (X_i - \bar{X})^2$	$\frac{2\sigma^4}{n-1}$	$\frac{2\sigma^4}{n-1}$	$\frac{2\sigma^4}{n-1}$	Sample variance
Binomial	p	$\frac{1}{n} \sum_{i=1}^n X_i$	$\frac{p(1-p)}{n}$	$\frac{p(1-p)}{n}$	$\frac{p(1-p)}{n}$	Sample proportion
	λ	$\frac{1}{n} \sum_{i=1}^n X_i$	$\frac{\lambda}{n}$	$\frac{\lambda}{n}$	$\frac{\lambda}{n}$	Sample mean
Poisson	μ	$\frac{1}{n} \sum_{i=1}^n X_i$	$\frac{\sigma^2}{n}$	$\frac{\sigma^2}{n}$	$\frac{\sigma^2}{n}$	Sample mean
	σ^2	$\frac{1}{n} \sum_{i=1}^n (X_i - \bar{X})^2$	$\frac{2\sigma^4}{n-1}$	$\frac{2\sigma^4}{n-1}$	$\frac{2\sigma^4}{n-1}$	Sample variance
Normal	μ	$\frac{1}{n} \sum_{i=1}^n X_i$	$\frac{\sigma^2}{n}$	$\frac{\sigma^2}{n}$	$\frac{\sigma^2}{n}$	Sample mean
	σ^2	$\frac{1}{n} \sum_{i=1}^n (X_i - \bar{X})^2$	$\frac{2\sigma^4}{n-1}$	$\frac{2\sigma^4}{n-1}$	$\frac{2\sigma^4}{n-1}$	Sample variance

2.2:1.0	1.2	5.5	7.5	7.4	9.4	7.2
2.1:1.2	0.4	3.3	7.6	8.0	9.7	8.4

A breeding population of 152 individual pheasants has been observed on the Neoga area since April 18 (See Table 2). Sixty-nine per cent of the breeding population is composed of wild-transplanted pheasants, while 25 per cent are of game farm stock. Observations of the two sources of pheasants have indicated that the wild-transplants, particularly the cocks, are more dominant than are the game farm birds. The territorial cocks are predominately wild-transplanted cocks and are more efficient in maintaining harems than are game farm cocks.

Since the releases were made during the past winter, 173 dead pheasants have been recovered. Of these, 139 were from the game farm stock, 16 were wild-transplants, and 9 were undetermined as to origin.

Table 2. --Number of individual pheasants located at Neoga April 18 to May 25, 1960. Data do not include repeat observations of individual pheasants.

	Cocks	Hens	Total	Per Cent
Game farm stock ("California" pheasants)	10	28	38	25
Wild-transplants	32	73	105	69
Unknown Origin	4	5	9	6
Totals	46	106	152	100

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v. 3
no. 6

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

June 1960

Vol. 3, No. 6

W-30-R-13

R. F. Labisky

On June 16, Robert I. Smith joined the staff to assume responsibilities as project leader of Project 30-R. Smith received his Bachelor of Science degree in Forest Management from Auburn University in 1953 and his Master of Science degree in Wildlife Management from Utah State University in 1955. During the past 5 years, Bob has been engaged in a detailed study of the ecology of the pintail duck in the Central and Pacific waterfowl flyways. This research will provide the thesis material for his doctorate degree which he will receive from Utah State University in the near future.

W-42-R-9

Rex Lord

Just before the opening of the 1959-60 cottontail season, this project placed a notice in newspapers of the state requesting one eye from every rabbit killed by hunters. At the end of the season, the hunters turned the eyes (preserved in jars in rubbing alcohol) over to their local conservation officer who in turn gave them to his supervisor who brought them to Springfield.

Cooperation on the part of the conservation officers was excellent, but poor notification of the public resulted in a low return. A total of 910 eyes were received from 26 counties.

Because of the small sample, the data were divided into three groups, one from each of three divisions of the state areas on a latitudinal basis, instead of into its natural physiographic regions. Using a breakdown of the state into northern, central, and southern zones and analyzing the data for the average age of the rabbits shot by the hunters, it was found that rabbits living in the central zone had the shortest average age (7.5 months). Those living in the northern zone had an average age of 9.0 months, and those living in the southern zone had the longest average age (10.0 months).

W-55-R-4

F. Bellrose

The project was inactive during June.

JUL 12 1960

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W-56-R-4

Glen C. Sanderson

Two manuscripts have been prepared, one giving techniques for estimating the ages of young raccoons during the summer and for separating both females and males into two age classes during the hunting and trapping season. The other manuscript also concerned aging but is based on the lens of the eyes.

The mean birth date for 17 litters of raccoons conceived in the wild was April 16; the earliest birth date was March 9 and the latest June 10. Thus, the mean birth data can be used for estimating the age of raccoons less than 1 year of age if body weight is not available.

Observed growth rates indicate that body weight will permit an estimate of age in young wild raccoons up to 7.0 pounds with an error believed to be no more than $\pm$ 2 months.

Studies of epiphyseal cartilage plates in the radii and ulnae of captive and wild raccoons of known ages indicate that, during the hunting and trapping season in Illinois, epiphyses may be used to separate males into two age groups. Those with broad epiphyses are older. Epiphyses and other structures may also be used to separate females into the same two age groups during the hunting and trapping season. All parous females (those with placental scars in the uterus) and all nulliparous females with thin or closed epiphyses are more than 1 year of age. Nulliparous females (those with no placental scars) and with broad epiphyses are less than 1 year of age. The latter animals did not breed during the first mating season following their birth.

In the raccoon, the lens will indicate the month of birth for individual raccoons up to approximately 12 months of age. The lens may be used to determine the general age composition of a population, but, because of great individual variation, it cannot be used to determine the age of individual animals that are older than 12 months.

W-61-R-3

F. Greeley, J. Ellis

An experiment to measure the combined effect of the amounts of calcium and phosphorus in the diet on laying hen pheasants was completed on June 1. The diets, containing various percentages of calcium and phosphorus, Table 1, were fed from March 8 to June 1. Last year it was found that hens lost a greater percentage of initial body weight, during the laying season (April 13 - June 4), on low calcium diets than on high calcium diets. In 1960, although some individual hens lost weight during the experiments, all groups showed an average gain in weight, Table 1. The gains were less, however, on low amounts of calcium than on high amounts of calcium. The effect of phosphorus on weight changes was not as evident although when the diets contained an adequate amount of calcium the weight gains were greater at high than at low levels of phosphorus. Hens in the wild, in a calcium or phosphorus deficient area, may lose more weight than is normal and have higher

mortality. Mortality in this experiment occurred mostly among hens fed low calcium and/or low phosphorus diets.

Table 1. --Per cent change in initial body weight of hen pheasants fed different amounts of calcium and phosphorus from March 8 - June 1, 1960.

Calcium (per cent)	Total Phosphorus (Per Cent)*			
	0.70-1.00	1.01-1.05	1.09-1.34	Mean
0.34-0.37	2.2 (1)	8.0 $\pm$ 3.1(4)	3.2 $\pm$ 3.5(6)	4.8 $\pm$ 2.0(11)
1.66-1.85	8.9 $\pm$ 5.3(7)**	7.0 $\pm$ 3.8(7)	15.3 $\pm$ 2.4(5)	10.3 $\pm$ 2.4(19)
2.06-2.19	9.8 $\pm$ 2.7(7)	13.7 $\pm$ 1.9(5)	13.9 $\pm$ 3.3(7)	12.3 $\pm$ 1.6(19)
Mean	9.3 $\pm$ 2.5(15)	9.3 $\pm$ 2.0(16)	10.7 $\pm$ 2.1(18)	

*The three levels of total phosphorus contained an estimated 0.32, 0.62 and 0.92 per cent of the diet in available phosphorus.

**Mean $\pm$ standard error; number of hens in parenthesis.

During June, 166 observations were made of pheasants on the Neoga area. Ninety-five per cent of the observations were made of wild transplanted pheasants; the remainder were observations of game farm pheasants.

Fifty-three pheasant nests have been located at Neoga. Average clutch size for 45 of the nests was 8.8. Fifteen of the nests were established by wild transplanted hens and three by game farm hens. The origin of hens from 35 nests was not determined. Field data strongly indicate that the wild transplanted pheasants have survived better on the Neoga area than have pheasants from game farm stock.

THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY
CHICAGO, ILLINOIS 60637

TO THE EDITOR:
I am writing to you to inform you of the results of my research on the properties of the new material which I have discovered. The material has many interesting properties and I believe it will be of great value to the scientific community.

The material is a new type of polymer which has been synthesized by a process which I have developed. It has a unique structure and properties which are different from any other polymer known to date. I have found that it has a high strength and is very resistant to heat and chemicals. It also has a low coefficient of expansion and contraction, which makes it very useful in many applications.

I have also found that the material has a very low density, which makes it very useful in many applications. It is also very easy to process and can be used in many different ways. I believe that this material will be of great value to the scientific community and I am sure that it will be widely used in the future.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

July 1960

Vol. 3, No.7

W-30-R-13

R. F. Labisky

The standardized counts of pheasant broods taken on the Sibley area during July, 1960, indicated a 57.7 per cent increase in the production of broods when compared to similar counts taken during July, 1959. The number of broods observed along 320 miles of roadside transect increased from 52 broods in 1959 to 82 broods in 1960. The mean age of the broods was 5.8 and 4.7 weeks in 1959 and 1960, respectively.

W-42-R-10

Rex Lord

Because of the discovery of a significant positive correlation between litter size and latitude in cottontails, a collection of rabbits was made in Illinois at three widely separated points in the northern, central, and southern parts of the state. To reduce the effect of habitat on age ratios and insure a representative sample, collectors confined themselves to roadsides between agricultural fields consisting mostly of corn, soybeans, and hay. Adequate samples were obtained from the southern and central areas, but difficulties were encountered in the northern area which may make it impossible to obtain the necessary basic information for that part of the state.

W-55-R-4

F. Bellrose

The project was inactive during July.

W-56-R-4

G. Sanderson
U. Meyers

During the first half of July, 1959, 48 raccoon- and 47 opossum-captures were made in 900 trap-nights on the Allerton Park study area, or 19 trap-nights each per raccoon and opossum caught. During a similar period this year three raccoons and nine opossums were caught in 518 trap-nights: 173 trap-nights per raccoon and 58 trap-nights per opossum. These data suggest that the

raccoon and opossum population may have declined sharply during the past year. The opossum population may have suffered heavier than usual mortality during the deep and prolonged snow of the past winter, for those trapped in early Spring were in unusually poor condition. It is doubted, however, that raccoons suffered any unusual degree of mortality during the heavier than usual snows. Indications other than those based on trap-nights on the study area and elsewhere are that the raccoon population is still at a high level.

The study of wood duck nesting in natural tree cavities in the Havana area has been completed for the 1960 season. Forty-eight nests were found on the 683-acre study area and observations at 7- and 11-day intervals revealed the following: 18 successful nests, 18 destroyed by raccoons, 8 by squirrels, 2 by snakes, and 1 lost because of tree damage. One unincubated dump nest was found.

Because regression of the ovaries of wood ducks does not begin until after incubation begins, destruction of a nest prior to incubation does not necessarily mean that hens which were unsuccessful with their first nest were unsuccessful for the whole season. Of the 18 nests destroyed by raccoons and the 8 destroyed by squirrels, 4 each were destroyed prior to incubation.

The increased nest depredations by raccoons this year resulted when flooding in the lowlands caused many raccoons to move to upland areas while wood ducks were establishing their nests. Depredations by raccoons on wood duck nests were higher during the early part of the nesting season than during the latter part.

W-61-R-3

J. Ellis, W. Anderson

A breeding population of 260 pheasants (84 cocks and 176 hens) has been located on the Neoga area. The estimate of the number of cocks is reasonably accurate; however, the hen estimate is lower than the number of hens actually present on the area. The sex ratio among pheasants released at Neoga last winter was 4.5 hens per cock. Sex ratios obtained from subsequent observations of pheasants in the field was near the sex ratio of released birds. Thus, a more representative estimate of the hen population can be obtained by multiplying the number of cocks located (84) by the sex ratio of the released birds (4.5). This produces an estimate of 378 hens.

Forty-eight individual pheasant broods have been observed on the Neoga area during June and July, 1960. The average number of observed chicks per brood was 8.4, and the individual broods averaged 4.3 weeks in age.

Among 81 adult pheasants observed on the Neoga area during July, 74 birds (91 per cent) were identified as wild transplants, 3 as game farm birds, and 4 were unidentified as to origin. Thus, the "California" birds have apparently contributed little to the population.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

August, 1960

Vol. 3, No. 7

W-30-R-14

R. F. Labisky, R. I. Smith

The standardized counts of pheasant broods taken on the Sibley area during July and August, 1960, indicated an increase in the production of broods when compared to comparable counts taken during 1959. The number of broods observed along 640 miles of roadside transect increased from 198 broods in 1959 to 235 broods in 1960, or 18.7 per cent. Comparable counts for 1957 and 1958 showed 194 and 240 broods, respectively. Although these data have not been adjusted for mean brood age, the data indicate that the 1960 pheasant hatch of chicks was most favorable and should approach the excellent number of young pheasants produced on the Sibley area in 1958.

W-42-R-10

R. D. Lord, Jr.

Analysis of data concerning the incidence of Shope's fibroma, the cancerous warts found on some rabbits' feet, showed that 8 out of 1,164 rabbits trapped on the Robert Allerton Park study areas had this disease, but none of the 1,506 cottontails taken in the agricultural habitat of central Illinois was infected. This disease is caused by a virus which has been demonstrated (in the laboratory) to mutate into the myxoma virus which causes myxomatosis, the rabbit disease which has wiped out 99 per cent of the Australian rabbit population and has since caused much trouble among wild rabbits in Europe. Both myxomatosis and Shope's fibroma are spread by mosquitoes. Cottontails seem to be immune to myxomatosis.

A paper, "Relation of ectoparasite populations to rabbit populations in northern Illinois", was published in the latest issue of the Journal of Wildlife Management by Dr. C. O. Mohr and the project leader.

The project leader gave two papers, "Seasonal changes in roadside activity of cottontails" and "Litter size and latitude in North American mammals", at the meetings of the American Institute of Biological Sciences at Stillwater, Oklahoma, this month.

W-55-R-4

F. Bellrose

The project was inactive during August.

W-56-R-4

G. Sanderson, U. Meyers

Live-trapping, marking, and releasing for study of raccoon and opossum populations was conducted on the Allerton Park Study Area from April 8 through August 20. Eighteen adult raccoons, and 50 adult and 32 young-of-the-year opossums were caught in 3,995 trap nights. It is notable that no young-of-the-year raccoons were caught although at least a few were present on the area as could be seen by their tracks. During a similar period in 1959, 52 adult and 101 young-of-the-year raccoons, and 123 adult and 62 young-of-the-year opossums were caught.

Although the number of trap nights required to catch one animal is only a crude indication of abundance, the differences in the results for the past two seasons indicate that populations of both raccoons and opossums are lower on the study area than they were one year ago. This area does not have much food available for raccoons and opossums in late winter, especially during deep snows such as the unusually deep ones of early 1960, and this may have affected survival.

The snow and weather also may have affected the reproductive ability of the raccoons as is shown by the reduced number of young on the area this year. This could have happened if the deep snows limited breeding activities. Female raccoons appear to have a rather long period of estrus, but once they pass this period they become pseudopregnant and do not have another estrous cycle until the following year.

An attempt was made to live-trap and mark raccoons on the raccoon and wood duck study areas along the Illinois River near Havana. Trapping was discontinued after 1,330 trap nights produced only seven raccoons. This rate of 190 trap nights per raccoon is similar to the 222 trap nights per raccoon required for the Allerton Park Study area this year. General observations of raccoons, tracks of both young and adults along streams, litters of young obtained after complaints by property owners, raccoon depredations on wood duck nests, and the number of litters found in cavities while checking for wood duck nests do not indicate that the raccoon population in these study areas is as low as live-trapping results indicate. It is possible that factors such as food or weather conditions which are not apparent at this time are influencing the success of the live-trapping of raccoons and opossums here.

W-61-R-4

J. A. Ellis, W. Anderson

Seventy-seven individual pheasant broods have been located on the Neoga area during this 1960 breeding season. A complete count of chicks for 57 broods showed an average brood size of 8.5 chicks at an average age of 5.0 weeks.

In August, 54 adult pheasants (23 cocks and 31 hens) were observed. Eight (15 per cent) were from game farm stock; 45 (83 per cent) were transplanted wild pheasants; and the origin of one pheasant was not determined.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

Sept
October, 1960

Vol. 3, No. 9

W-30-R-14

R. F. Labisky, R. I. Smith

Field investigations of pheasant nesting and its relation to land use on the intensively cultivated Sibley area are nearing completion for 1960. The 100 randomly selected 10-acre study plots (representing a 4.3 per cent sample of the 23,200-acre study area) that were searched for nests in 1957, 1958, and 1959 were again searched in 1960. Thus far, 281 nests have been located during the 1960 nesting season, and 85 (30.2 per cent) of these nests have hatched. A comparison of the densities of established and hatched nests for the 4 years, 1957 through 1960, are presented in Table 1.

Table 1. --Densities of established and hatched pheasant nests, Sibley Study Area, 1957-60.

Years	Densities: Nests per 100 Acres of Land Area	
	Nests Established	Nests Hatched
1957	12.4*	4.2
1958	26.6	7.9
1959	23.6	5.6
1960**	28.1	8.5

*Sample sizes (number of nests) can be obtained by removing decimal points in all figures.

**Field work not complete for 1960 as of this date of preparation of report.

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF CHEMISTRY

RESEARCH REPORT

NO. 1000

BY

DR. J. H. HARRIS

AND

DR. R. M. HARRIS

CHICAGO, ILLINOIS

1950

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W-42-R-10

R. D. Lord, Jr.

The project has moved ahead on several fronts this month. Traps were repaired and painted and live trapping was begun on the Allerton study areas. Small samples of blood were taken from the rabbits for testing for Shope's fibroma and myxomatosis.

Experiments designed to determine the pattern of activity were begun with two rabbits which were placed in a room which is periodically blacked out to determine the ability of the rabbits to maintain their normal pattern of activity. In a study designed to determine the nightly range of the cottontail, a small harness containing a battery and bulb has been developed and field tested with success. Next month this apparatus will be used to trace the entire night's activity of several rabbits.

Data have been compiled concerning the gain in weight of juvenile rabbits on the Allerton study areas. When fully analyzed these data will describe a growth-rate curve for the cottontail which will enable estimation of ages of young cottontails. The number of measurements made is larger than those reported by other investigators and should make age determination of living rabbits more exact.

W-55-R-4

F. C. Bellrose

Three aerial surveys of waterfowl populations were carried out in the Illinois and Mississippi River valleys in September. The surveys were exactly one week apart, commencing on September 14.

The numbers of ducks observed during this period increased from an estimated 41,000 to 66,000. The most numerous species in order of abundance were: blue-winged teal, green-winged teal, widgeon, pintail, wood duck, and shoveler.

In comparison with other years, blue-winged teal and pintail populations have been appreciably below normal. Because the blue-winged teal migration is almost over, it is apparent that the population of this species is down appreciably in the Mississippi Flyway. Green-winged teal and widgeon numbers have been above normal.

W-56-R-4

G. C. Sanderson, U. Meyers

The data on raccoon-wood duck relationships near Havana were compiled for 1960. Wood ducks arrived 2 to 3 weeks later than they did the previous two years. This was thought to have been a result of the unusually heavy snows and below freezing temperatures in March. There was a corresponding delay in establishment of nests.

One hundred and twenty-four natural cavities believed to have been suitable for nesting wood ducks were under surveillance throughout the nesting season. This represented an average density of one cavity per 4.5 acres compared with one cavity per 4.9 acres in 1958 and 1959.

Thirty-four per cent of the natural cavities and 44 per cent of the nest boxes were used by wood ducks on the unit containing both nest boxes and natural cavities. During the two previous seasons on this same unit, 24 per cent of the natural cavities and 19 per cent of the nest boxes were used. The increase in use in 1960 probably indicates an increase in the population of breeding wood ducks. In 1960, 39 per cent of all natural cavities were used by wood ducks. By contrast, in 1939 and 1940, 51 per cent of the natural cavities in the same general area were used. Thirty-seven per cent of 48 nests attempted in all natural cavities were successful in 1960. This may be compared to an average success of 52 per cent in 1958 and 1959. Nesting success in raccoon-proof nest boxes was 83 per cent, and 75 per cent of the nests in natural cavities protected by "Tanglefoot" were successful.

Raccoons destroyed 9 per cent of all nests in natural cavities protected by "Tanglefoot" and 47 per cent of those in unprotected natural cavities. High water in bottomlands adjacent to the study area throughout March, April, and May caused many raccoons to move to the upland area and probably contributed to the increased depredations by raccoons in 1960. Fox squirrels destroyed 17 per cent of the nests in natural cavities and 2 per cent of those in nest boxes.

W-61-R-4

J. A. Ellis, W. L. Anderson

A comparison of the hatching dates of successful nests with the unrealized hatching dates of unsuccessful nests at Neoga provided enlightening information on the seasonal timing of the successful nesting of pheasants south of the established range. Dates of hatching for successful nests were obtained by backdating from the estimated ages of broods aged in the field. The dates on which unsuccessful nests would have hatched if successful was determined by aging the embryos of unhatched eggs and advancing the date to the probable time of hatching. By June 5-11, 50 per cent of the 36 accurately aged broods had hatched, whereas the estimated time (June 26-July 2) of hatching for 50 per cent of the 49 unsuccessful nests occurred 3 weeks later, a time by which 89 per cent of the broods had hatched. These findings tentatively suggest that the major increment of the 1960 hatch of pheasants at Neoga was contributed by hens which established nests prior to May 25.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

Oct
November, 1960

Vol. 3, No. 10

W-30-P-14

R. F. Labisky, R. I. Smith

The 1960 field investigations of the reproductive ecology of the pheasant on the intensively cultivated Sibley area were completed in October. The 100 randomly selected plots in this area have been searched for nests each year since 1957. A total of 280 nests were found in 1960, which exceeds the previous maximum for a single year (1958) by 14 nests or 3.7 per cent. In 1960, 30.36 per cent of the established nests were successful. Comparisons of nest establishment and nest success in each cover type for the past four years are presented in Table 1.

W-42-R-10

R. D. Lord, Jr.

A growth-rate curve of young cottontails has been calculated for use in estimating the date of birth of juveniles captured in the wild. The curve is based on 973 observations of 50 rabbits raised in captivity and 234 observations of 119 wild rabbits recaptured at intervals. The large number of observations makes it possible to calculate the 95 per cent confidence limits for the curve for application to an estimate. For example, a young rabbit weighing 200 grams (about 7 ounces) is estimated to be 33 days old and 95 out of 100 rabbits weighing the same are between 25 and 44 days old. This curve has been developed to 100 days of age. After 100 days the individual variation of gain in weight is so great that an estimate of age based on body weight is a poor one.

W-55-R-4

F. C. Bellrose

Four aerial censuses were made of waterfowl populations in the Illinois and Mississippi River valleys during October. Populations of ducks increased from 75,000 on October 5 to 421,000 on October 24.

During the month of October, species of ducks most abundant were green-winged teal, widgeon, pintail, and mallard. Mallards made up 4.5 per cent of the duck population on October 5, 23 per cent on October 12, 56 per cent on October 19, and 60 per cent on October 24.

The numbers of diving ducks were much below normal for October, especially in the Illinois River valley.

Table 1. --Percentage comparison of nest establishment and nest success by cover type, Sibley Study Area, 1957-60, inclusive. Numbers within parentheses represent number of nests found.

Cover Types	Nests Established					Nests Successful			
	1957	1958	1959	1960	1960	1957	1958	1959	1960
Row Crops	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)
Small Grains	16.1(20)	7.9 (21)	24.2 (57)	8.6 (24)	55.0(11)	33.3 (7)	38.6(22)	50.0(12)	50.0(12)
Hayfields (tame)	46.8(58)	69.9(186)	44.9(106)	63.6(178)	32.8(19)	31.2(58)	19.8(21)	33.4(54)	33.4(54)
Pastures (tame & wild)	24.2(30)	6.0(16)	14.4 (34)	9.3 (26)	16.7 (5)	50.0 (8)	17.6 (6)	19.2 (5)	19.2 (5)
Strip Cover	12.1(15)	15.8(42)	13.1 (31)	16.7 (47)	40.0 (6)	11.9 (5)	22.6 (7)	23.4(11)	23.4(11)
Non-agricultural	0.8 (1)	0.4 (1)	3.4 (8)	1.8 (5)	100.0 (1)	100.0 (1)	0.0 (0)	60.0 (3)	60.0 (3)
Total or Means	100.0(124)	100.0(266)	100.0(236)	100.0(280)	33.9+8.4*(42)	29.7+6.5(79)	23.7+5.5(56)	30.4+5.4(85)	30.4+5.4(85)

*Fiducial limits at 0.05 level.

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W-56-R-4

G. C. Sanderson

From April through August 1960, raccoons and opossums were live trapped, ear-tagged, and released on the Allerton Park Study Area in Piatt County. Opossums in the pouch were marked by toe clipping. Beginning with September 1, all raccoons and opossums caught have been removed from the area in an attempt to reduce the populations on the study area.

Prior to September 1, 14 adult male and 3 adult female raccoons were trapped, marked, and released. Since September 1, two of these males and two of these females have been removed. In addition, two unmarked females and one unmarked male, all adults, have been caught. Thus, 2 of 3 adult females live trapped prior to September 1 have been removed, but only 2 of 14 adult males have been removed. Young raccoons were not trapped before September 1 this year; however, since that time nine young have been caught. These young are smaller than usual for this time of year. Their smaller size and the fact that none was trapped prior to September 1 suggests that unseasonably cold weather and snow delayed the 1960 breeding season.

Prior to September 1, 7 adult male and 12 adult female opossums were caught. Seventy-four young were toe-clipped in the pouches of these females, and 21 unmarked, juvenile opossums were live trapped, marked, and released. Since September 1, 53 opossums have been trapped and removed from the area; 25 of these had been previously marked, either toe-clipped or ear-tagged. Thus, of 95 juvenile opossums marked in 1960, 21 or 22 per cent have been removed, and 4 of 19 adults, or 21 per cent of the marked adults, have been caught and removed.

W-61-R-4

J. A. Ellis, W. L. Anderson

The first attempt to night-light pheasants was made on the Neoga area. Thirty pheasants were captured in 5.5 hours of night-lighting in the field. Of the 30 birds captured, 7 (23 per cent) were cocks. The age ratio of the captured birds was 6.5 juveniles per adult. The four adult birds were wild-transplanted hens. In addition, 54 birds were flushed during night-lighting, and 21 (39 per cent) were cocks. Only one game farm bird was observed during the night-lighting operations.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

November, 1960

Vol. 3, No. 11

W-30-R-14

R. F. Labisky, R. I. Smith

A summary of data collected on the Sibley Study Area during the 1956 through the 1960 hunting seasons is presented in Table 1. The information was obtained by interviewing hunters through the 20-day open season (November 11-30) in all years. The daily bag limit was two cocks in 1956, 1957, and 1958, while in 1959 and 1960 a kill of three cocks per day was permitted.

Data from nesting studies, standardized brood counts, and pre-hunt sex and age ratios obtained by night-lighting indicated that the 1960 fall population was at least 20 per cent greater than in 1959. The age ratio of cocks killed in 1960 (8.3 juveniles/adult) supports this contention.

Several factors influenced hunter success in 1960, making hunting effort per cock killed (3.1 hours/cock) greater than all previous years except 1957. Late planting of corn resulted in a late harvest; consequently large acreages of standing corn were present on the study area during the first 10 days of the 1960 hunting season. Concentrations of pheasants in unharvested corn were inaccessible to hunters on many farms and in all cases made hunting more difficult. This is reflected to some extent in the high crippling loss of 31.9 per cent for the season. Hunting pressure during the last 10 days of the season was light, and hunter success did not improve following the corn harvest.

Table 1. --Pheasant Harvest Data Collected During the 1956 Through 1960 Hunting Seasons, Sibley Area.

Year	Number of Hunters Interviewed	Number of Cocks Aged by Bursal Examination	Age Ratio of Bagged Cocks Young/Adult	Gun-Hours Per Bagged Cock	Percentage of Cocks Crippled	Percentage of Cock Population Harvested
1956	525	251	12.5	2.3	34.0	59.4
1957	443	290	4.7	3.5	24.4	12.4
1958	595	445	6.4	2.5	23.0	44.0
1959	461	454	5.6	2.9	17.8	52.5
1960	496	441	8.3	3.1	31.9	

THE UNIVERSITY OF CHICAGO

DEPARTMENT OF CHEMISTRY

REPORT

ON THE
ANALYSIS OF
THE
SOLUBLE
SALTS OF
THE
ALKALI METALS

BY
J. H. HARRIS
AND
J. H. HARRIS

CHICAGO, ILL.
1911

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1911

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CHICAGO, ILL.

NAME	ANALYST	ANALYST	ANALYST	ANALYST	ANALYST	ANALYST
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49
50	51	52	53	54	55	56
57	58	59	60	61	62	63
64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91
92	93	94	95	96	97	98
99	100	101	102	103	104	105

W-42-R-10

R. D. Lord, Jr.

On November 12, census drives were carried out with the aid of the University of Illinois class in wildlife management on the two 100-acre Allerton Park study areas. The results indicated a population of 309 rabbits on the 4-H area and 125 rabbits on the Sanctuary area. These estimates correspond very closely with those of the previous 4 years, indicating that rabbits populations on these areas have been stable.

Analysis of the home range of the cottontail based on captures made over the past years on the Allerton park study areas indicates that the average home range was 2.34 acres. The largest home range recorded was 10.58 acres. There was a considerable difference in the size of the home range between the 4-H area and the Sanctuary. The average home range on the 4-H area was 2.50 acres and on the Sanctuary area it was only 1.75 acres. Adults had larger home ranges (2.65 A.) than did juveniles (2.27 A.), but there was no difference in the size of the home range between males and females.

W-55-R-4

F. C. Bellrose

Four weekly censuses of waterfowl populations in the Illinois and Mississippi River valleys were taken during the month of November. Duck populations during this period were similar in magnitude to those during the same period in 1959. However, they were 40 to 50 per cent below the average duck populations which prevailed during the period 1944-1958.

The principal flight occurred on November 8-9, which increased duck populations in the state from 554,000 to 1,139,000. Although there have been two small flights since the grand passage, the ingress was more or less balanced by egress.

W-56-R-4

G. C. Sanderson

The infectious enteritis which killed all but 2 of the 22 young raccoons being held in captivity in the fall of 1959 is still present. All young raccoons placed in captivity this year have contracted the disease. It has been learned that, if treatment is begun soon enough with the proper antibiotics, the raccoons will survive. No positive cases of this disease have been identified from wild raccoons. A possible case is a young male raccoon found in Hancock County on October 25, 1960. This animal, which died after a few hours in captivity, had symptoms which appeared to be typical of infectious enteritis. The University of Illinois, College of Veterinary Medicine, plans to use material from this animal in attempts to infect minks and raccoons as a part of their study of infectious enteritis.

Information from fur houses indicates that near record numbers of raccoons were harvested by hunters and trappers during the early part of the season, at least in the central and northern sections. Probably the pleasant weather which prevailed during much of November afforded conditions favoring the large kill.

W-61-R-4

J. Ellis, W. L. Anderson

Night-lighting at Neoga prior to the pheasant hunting season resulted in the capture of 76 pheasants. A total of 212 pheasants were observed; 35.8 per cent of these were captured. It required an average of 3.9 minutes to find a pheasant and 10.8 minutes to capture one.

The sex ratio of all the pheasants observed, including those captured, was 1.33 hens per cock. The age ratio of those captured was 5.9 juveniles per adult; the hen age ratio was 11.6 juveniles per adult hen, indicating excellent production on the area in 1960. Examination of the molt of the primary wing feathers revealed that 27 per cent of the juveniles were hatched after the second week of July.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

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W-30-R-14

R. F. Labisky, R. I. Smith

Pheasants have been trapped on the Sibley study area during fall and winter for the past 5 years through use of the night-lighting technique. Each bird was marked with a numbered back-tag and released at the trapping site. Three hundred forty-eight or 24.3 per cent of the 1,435 tags used during the 4-year period, 1956-59, have been recovered as mortalities, resulting from hunting, farming operations, road kills, predation, and other natural crises. The date or estimated date of death was recorded for each tag recovered. The data in Table 1 represent mortality of pheasants marked within a specific calendar year, but without special reference as to what specific date the birds were marked within the year.

Life expectancy of marked hens was greater than that of marked cocks, assuming that tag-recovery rates reflect mortality rates. Only a small percentage of the marked hens survived to the third year following the date of tagging. Even though the cock segment of the population exhibited a more rapid turnover, the percentage of cocks removed by hunting each year (based on pre- and post-hunting season sex ratios) did not show a direct relationship to the turnover of the cock segment of the population.

Table 1.-- A comparison of pheasant back-tag recovery rates and the per cent of cocks harvested on the Sibley study area, 1956 through 1960.

Year	Per cent of Sibley area cocks removed by hunting*	Tag recoveries as of Jan. 1, 1961	Per cent of tag recoveries occurring each year				
			1956	1957	1958	1959	1960
1956	59.4	♂ 63	79.4	19.0	0.0	1.6	0.0
		♀ 20	35.0	50.0	5.0	5.0	5.0
1957	12.4	♂ 52		73.1	21.2	3.8	1.9
		♀ 31		48.4	41.9	6.5	3.2
1958	44.0	♂ 85			97.6	2.4	0.0
		♀ 31			41.9	35.5	22.6
1959	52.5	♂ 39				100.0	0.0
		♀ 27				55.6	44.4

*This percentage obtained from pre- and post-hunting season sex ratios.

W-42-R-10

R. D. Lord, Jr.

The project leader attended the Mid-west Wildlife Conference in Toronto, Ontario, where two papers were presented. One paper was concerned with age composition and mortality rates of the Illinois deer population as determined by the lens technique. The other paper was on the diseases of cottontail rabbits. This paper was prepared by Deam Ferris; however, Ferris was unable to attend the conference, and the paper was presented by Lord.

Three new cases of Ferris' torticollis disease have occurred in the penned rabbits being held for behavior observations. Fortunately, these rabbits were obtained while still alive, and all were submitted to detailed investigations of the cause and nature of the disease. The appearance of this disease in winter for the first time has important implications concerning the epizootiology of the disease. Formerly it was thought that vectors such as ticks or mosquitoes might be implicated in the transmission of the disease. However, in this instance, such vectors were not known to have been present.

W-55-R-4

F. C. Bellrose

The last large duck flight of the season occurred on November 28 and 29. An aerial census of waterfowl populations in the Illinois and Mississippi River valleys on December 1, revealed the presence of 1,157,000 ducks, an increase of over 500,000 from November 23. This was the largest number of ducks recorded at any one time during the 1960 season, and larger than at any time during the 1959 season.

A census of the same area on December 14, showed only 661,000 ducks present. Snow and cold weather was responsible for the departure of almost 500,000 mallards during the second week of December.

W-56-R-4

G. C. Sanderson

As mentioned in a previous report, 10 times as many trap nights were required to catch one raccoon on the Piatt County study area in 1960 as in 1959. Thus, only 16 raccoons were live trapped on the study area in 1960 prior to September 1. After September 1, trapping success improved as young raccoons began to enter the traps (in a normal year young raccoons begin to enter the traps in June); however, all animals trapped after September 1 were removed from the area in order to reduce the population. By the end of December, 5 of the 16 marked raccoons, or 31.2 per cent, had been removed from the area. These five included three which were live trapped and two which were killed by hunters. In 1959, 21 of 71 (30%) of the marked animals had been killed by hunters and trappers by the end of December, and, in 1958, slightly less than 20 per cent had been killed by the same time. Thus, although the number of marked animals killed by the end of December declined this year, the percentage killed was about the same as it was in 1959.

In addition to the five raccoons mentioned above which were trapped in 1960 and later harvested, two animals tagged during previous years were removed.

Female No. 44 was live trapped three times in 1957, once in 1958, twice in 1959, and was live-trapped and removed from the area on September 9, 1960. Female No. 76 was first trapped on August 2, 1957, and was retrapped on June 8, 1958. It was not trapped in 1959 but was killed by a hunter on November 5, 1960. Of 146 raccoons first marked in 1957 and 1958, 30 per cent have either been killed or were known to be alive in 1960.

W-61-R-4

J. A. Ellis, W. L. Anderson

Final analysis of hunting data revealed that a minimum of 111 cocks were bagged on the Neoga area during the 1960 season. Two hundred and sixty-one hunters in 105 parties expended 571 gun-hours to bag 93 of the cocks, representing an effort of 6.14 gun-hours to bag 1 cock. In addition, 21 cocks were crippled and not recovered. The location of kill of 103 of the bagged cocks was determined, and 87 (84.5 per cent) of these cocks were bagged within an area of 8 sections. The age ratio for 89 of the bagged cocks was 10.1 juveniles per adult. An estimate of the number of young produced per adult hen is computable from the age ratio of bagged cocks and the preseason sex ratio by using the formulas below. In these formulas, the sex ratio among juvenile pheasants is assumed to be equal.

$$\frac{1 \text{ adult cock} + 10.1 \text{ juvenile cocks per adult cock}}{x \text{ adult hens} + 10.1 \text{ juvenile hens per adult cock}} = \frac{3}{4} \text{ or preseason sex ratio}$$

$$x = 4.7 \text{ adult hens per adult cock}$$

then

$$\frac{10.1 \text{ juvenile cocks} + 10.1 \text{ juvenile hens}}{4.7} = 4.3$$

4.7

Therefore, 4.30 young of both sexes were produced per adult hen. During July and August, 53 per cent of the hens observed were accompanied by broods. If we assume that 53 per cent of the hen population were productive, then 8.11 young were produced per productive hen. The observed average brood size during the breeding season was 8.52 young.

Calculations made from changes in the pre- and post-season sex ratios and the per cent of pre-season marked cocks that were bagged produced estimates of the pre-season population of 626 (269 cocks and 357 hens) and 777 pheasants (333 cocks and 444 hens), respectively. These estimates indicate that 39.6 to 49.1 per cent of the cocks were bagged or crippled by hunters.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

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Vol. 4, No. 1

W-30-R-14

R. F. Labisky, R. I. Smith

Studies of nesting ecology of pheasants on the Sibley area have demonstrated an important relationship between reproduction and land-use changes during the past 3 years. Approximately 44 per cent of the 23,000-acre study area is estate-owned and tenant-farmed, and management of this land is under the supervision of three farm managers or agencies. The remainder of the area is privately owned and subject to various management programs. Acreages of corn and soybeans on estate land have increased from 54 per cent of the total land area in 1958 to 76 per cent in 1960. During the same period, acreages of hay and small grains have declined from 29 per cent to 10 per cent of the land area. Corresponding increases in row crops and decreases in hay and small grain have not occurred on private lands.

Densities of hatched nests per hundred acres of estate land have decreased from 15.5 in 1958 to 7.8 in 1960. On non-estate land the density of hatched nests has increased from 2.8 to 9.0 per hundred acres. The impact of changing land-use on reproduction of pheasants is even more striking when one considers that estate lands yielded 454 per cent more hatched nests per unit of land area than did private lands in 1958, but that private lands yielded 15 per cent more hatched nests per unit land area than did estate lands in 1960. If the trend toward larger acreages of corn and soybean continues on estate land and becomes a part of non-estate management as well, the effect on pheasant populations in future years could be adverse.

W-42-R-10

R. D. Lord, Jr.

During the months of December and January, a roadside survey was made of the relative distribution and abundance of rabbits on an area in east central Illinois. The purpose of the survey was to determine if a suspected relationship between rabbit abundance and glacial moraines had any basis in fact. The area covered most of Champaign County and extended into Iroquois, Ford, McLean, Piatt, and Douglas Counties, an area of 1,326 square miles. All east-west and north-south roads were driven at about 35 m.p.h. from about 7:00 p.m. to midnight whenever weather permitted. A total of 2,158 miles were driven which is 84 per cent of complete coverage (if every section line had a road). A total of 639 rabbits were seen which is an average of 0.296 rabbits per mile.

For analysis, the number of rabbits seen per mile was compared to the number of 10-foot contour interval lines intersected by that same mile on a geological survey map. The data plotted a positive regression by the method of least squares ($m = 2.50$) of rabbits seen with the number of contour lines intersected. The correlation coefficient was 0.71, which was significant by the t test at the 1 per cent level. Construction of a map showing the relative distribution of the rabbits and the location of the moraines did not show any striking restriction of rabbits to the moraine system. It was apparent that cottontails were everywhere but we were looking for some relationship between the land and the relative abundance of rabbits. Because of the results of the statistical analysis, the river system was also drawn into the map and immediately the relationship became apparent. Wherever there were many rabbits there was either a moraine or a stream. Probably the dissection of the land by the stream and its tributaries over the past geological history has caused the necessary hillyness which is in some way more favorable to rabbits than the flatter land.

W-55-R-5

F. C. Bellrose

As part of the nation-wide January inventory of waterfowl, we made aerial censuses of waterfowl on the Illinois River between Grafton and Joliet and on the Mississippi River from Alton to Rock Island on January 8 and 9, 1961. In addition, waterfowl on Lakes Decatur and Springfield were also inventoried.

Including the surveys of other observers in Illinois, we found 327,000 mallards, 16,000 black ducks, 2,600 canvasbacks, 2,000 lesser scaups, 11,000 common goldeneyes, and 19,500 American mergansers. Including species which were low in number and species which were unidentified, 384,000 ducks were estimated to have been in the state. Last year's winter inventory provided the basis for an estimate of 543,000 ducks in the state at that time. Unseasonably cold weather in December combined with snow to result in the low number of ducks found on this year's inventory.

W-56-R-5

G. C. Sanderson

Compilation of data collected in Illinois from 1955 through October 1956 shows that some wild, adult, male raccoons are sexually active (based on presence of sperm in the epididymis) by October, and, by December 97 per cent (113 of 116) of the adult males reach this stage. Most remain sexually active through April, but from June through September a majority of the adult males are sexually inactive. Average weights of testes indicate these organs reach maximum size in December. This size is maintained through January, but by the time most mating occurs (mating season is January 15 - April 15 with the peak occurring about February 15) the testes are already regressing in size. This regression continues

The first part of the paper is devoted to a general discussion of the problem. It is shown that the problem is of great importance in the theory of differential equations. The second part is devoted to the construction of the solution. It is shown that the solution can be constructed in a unique way. The third part is devoted to the study of the properties of the solution. It is shown that the solution has certain properties which are of great importance in the theory of differential equations. The fourth part is devoted to the study of the stability of the solution. It is shown that the solution is stable under certain conditions. The fifth part is devoted to the study of the asymptotic behavior of the solution. It is shown that the solution has a certain asymptotic behavior which is of great importance in the theory of differential equations.

The sixth part is devoted to the study of the properties of the solution. It is shown that the solution has certain properties which are of great importance in the theory of differential equations. The seventh part is devoted to the study of the stability of the solution. It is shown that the solution is stable under certain conditions. The eighth part is devoted to the study of the asymptotic behavior of the solution. It is shown that the solution has a certain asymptotic behavior which is of great importance in the theory of differential equations. The ninth part is devoted to the study of the properties of the solution. It is shown that the solution has certain properties which are of great importance in the theory of differential equations. The tenth part is devoted to the study of the stability of the solution. It is shown that the solution is stable under certain conditions. The eleventh part is devoted to the study of the asymptotic behavior of the solution. It is shown that the solution has a certain asymptotic behavior which is of great importance in the theory of differential equations.

The twelfth part is devoted to the study of the properties of the solution. It is shown that the solution has certain properties which are of great importance in the theory of differential equations. The thirteenth part is devoted to the study of the stability of the solution. It is shown that the solution is stable under certain conditions. The fourteenth part is devoted to the study of the asymptotic behavior of the solution. It is shown that the solution has a certain asymptotic behavior which is of great importance in the theory of differential equations. The fifteenth part is devoted to the study of the properties of the solution. It is shown that the solution has certain properties which are of great importance in the theory of differential equations. The sixteenth part is devoted to the study of the stability of the solution. It is shown that the solution is stable under certain conditions. The seventeenth part is devoted to the study of the asymptotic behavior of the solution. It is shown that the solution has a certain asymptotic behavior which is of great importance in the theory of differential equations.

until it reaches a low point in July at which time average testis weights are approximately half their maximum weight.

Studies made by following individual, captive, adult males indicate that most males are sexually inactive for a period of 2 to 4 months. This period usually comes from June through October; however, because of individual variation, a few sexually active males may be found in any month of the year.

Thus, in the raccoon, as in many other species, the female determines the actual time of mating. The male's period of sexual activity begins earlier and ends later than it does in the female. April 16 was the average date of birth of 18 raccoon litters (gestation period 63 days) conceived in the wild. These were all from central or northern Illinois. The earliest litter was born March 9 and the latest June 10. Five litters were born in March, eleven in April and one each in May and June.

W-61-R-4

J. Ellis, W. Anderson

During December, 1960, 300 wild pheasants (50 cocks, 250 hens) were captured in Livingston County and transported to the Neoga area where they were released for purposes of augmenting present population levels. Ten per cent of the 50 cocks were adults, and 36.8 per cent of the 250 hens were adults.

Fluoroscopic examination of these wild pheasants revealed that lead shot was present in 15 (30.0 per cent) of the 50 cocks and 7 (2.8 per cent) of the 250 hens. The mortality of hens resulting from hunting was calculated by using harvest data obtained on the Sibley area during the 1960 hunting season (see following equation). This was possible because all the birds were captured within 5 miles of the Sibley area and because population levels and hunting pressure were similar on this area.

$$\frac{(X) \text{ Per cent of hens killed}}{\text{Per cent of cocks harvested}} = \frac{\text{Per cent of hens with shot}}{\text{Per cent of cocks with shot}}$$

$$\text{then } \frac{X}{52.0} = \frac{2.8}{30.0} \quad X = 4.8$$

These calculations indicated that 4.8 per cent of the hens were shot by hunters during the 1960 pheasant hunting season.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

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W-30-R-14

R. F. Labisky, R. I. Smith

A final analysis indicates that 52.0 per cent of the cocks were removed from the pheasant population on the Sibley area by hunters during the 1960 hunting season. The estimate was based on the change between the pre-season sex ratio of 45.3 per cent cocks, obtained from the night-light trapping of 189 pheasants during October and early November, 1960, and the post-season ratio of 21.7 per cent cocks, obtained from roadside counts of 4,118 birds during January and February, 1961. The harvest of cocks on the Sibley area during previous hunting seasons was 59.4, 12.4, 44.0, and 52.5 per cent in 1956, 1957, 1958, and 1959, respectively.

W-42-R-10

R. D. Lord, Jr.

Much of this month was spent in writing the manuscript for the cottontail bulletin and analyzing activity data. However, the prototype model of a transistorized radio transmitter to be placed on rabbits to accurately study home ranges was developed by Bill Cochran for this project. This prototype has a range of about $\frac{1}{2}$ mile and weighs only 50 grams. Cochran is now constructing a directional finding receiver for use with the transmitters.

A check of rabbit damage to trees on the 4-H study area showed that damage was greater this year than in any of the past four winters. This was probably due to the lack of artificial food being supplied this winter plus a larger winter population due to no hunting on the area.

W-55-R-5

F. C. Bellrose

The initial aerial census of waterfowl found in Illinois during the spring season was made on February 24. Even at this early date the spring migration of waterfowl was underway as indicated by the appearance of several species not found on the winter inventory taken in early January.

Of the early migrants, pintails were the most common, numbering over 6,000, followed in order by 4,000 canvasbacks, 1,100 ring-necked ducks, and 100 redheads. A few small flocks of widgeons, gadwalls, and green-winged teals suggested that these species were just beginning to arrive in the state. This

early movement of waterfowl is in great contrast to the late migration in the spring of 1960, which was the latest migration on record.

W-56-R-5

Ralph J. Ellis

A new project leader assumed responsibility for leadership of the project on February 1. Familiarization with the project accounted for most of his time. Otherwise, several thousand raccoon bacula were collected from fur buyers throughout the state. These will be used to estimate the magnitude of the last reproductive season. Questionnaires for obtaining the average price paid per pelt were mailed to all Illinois fur buyers.

An attempt to reduce the raccoon population on the Allerton Park study area in Piatt County was begun. It is believed that this operation will provide information on the effectiveness of control methods and the magnitude of reduction necessary in order to obtain effective population control. It will also make it possible to study population mechanics, behavior and infestations by ectoparasites during periods of low population. To effect population control, 80 steel traps were set throughout the study area on February 20. Two opossums were the only furbearers caught during 8 days of trapping. A paucity of sign indicated that the raccoon population was low. Possibly this can be attributed, at least in part, to heavy snowfall during the 1960 mating season. Deep snow tends to restrict raccoon movements and thereby reduces the number of matings. If a female does not mate during the first estrous period, she usually goes into pseudopregnancy and probably does not rear young that year.

W-61-R-4

J. Ellis, W. Anderson, J. Harper

From March 8, 1960 to May 31, 1960, nine groups of hen pheasants were fed diets containing different amounts of calcium and phosphorus. Egg production, egg weight, and shell thickness, bone weight and ash-content, body weight, and breast fat increased as the level of calcium in the diet increased from a low of 0.34 - 0.37 to a maximum of 2.06 - 2.19 per cent. Different levels of phosphorus (0.32, 0.62, and 0.92 per cent) had no effect on the above measurements with the exception of the mean, fat-free dry weight of femora, and breast fat of hens. Mean, fat-free dry weight of femora increased as the level of phosphorus in the diet increased. The amount of breast fat on hens increased with progressively higher levels of calcium in their diets but decreased with progressively higher levels of phosphorus in their diets.

Mr. James A. Harper assumed duties as an assistant project leader on February 15, 1961. Harper received a B.S. degree from Oregon State and an M.S. degree from Humboldt State; both degrees were in Wildlife Management. He investigated the ecology of the Roosevelt elk to obtain thesis material for the M.S. degree.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

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W-30-R-14

R. F. Labisky, R. I. Smith

Data obtained by the night-light trapping of pheasants on the Sibley study area, 1956 through 1960, indicate that juvenile hens suffered a higher mortality than adult hens between fall and early winter in each year except the 1958-59 season.

Body weights of females trapped during October and November indicate that the age and subsequent weight of juvenile females during this period may be related to this mortality (Table 1). The 1958 hatch of pheasants occurred relatively late (mid-point of hatch, June 29-July 5), and this is reflected in the comparatively low weights of juvenile hens in October. Weights of juvenile females increased from October to November of 1958 at a rate which exceeded all other years.

It has been proposed that late hatches place a physiological stress on adult hens which increases the late summer and fall mortality of this age group. However, these data suggest that a late hatch may favor the survival of juvenile females and thereby more than offset the accompanying loss of adult hens.

Table 1.-- Changes in the age composition of the female segment of the Sibley pheasant population in relation to body weights in October and November.

Year	Per Cent Juvenile Hens in Female Population			Average Weight of Adult Hens (gm)			Average Weight of Juvenile Hens (gm)		
	Pre- Hunt	Post- Hunt	Change	Oct.	Nov.	Change	Oct.	Nov.	Change
1956-57	77.1	65.4	-11.7	951	953	+ 2	868	898	+30
1957-58	60.6	50.0	-10.6	936	966	+30	827	875	+73
1958-59	70.0	72.9	+ 2.9	932	959	+27	788	884	+96
1959-60	59.8	55.3	- 4.5	941	932	- 9	859	866	+ 7
1960-61	56.5	43.3	-13.2	945	1,016	+71	878	872	- 6

W-42-R-10

R. D. Lord, Jr., D. A. Casteel

The late winter census on the Allerton Park study areas showed a population of 162 rabbits on the 4-H area and 54 rabbits on the Sanctuary area. This is a probability of dying of only 48 per cent on the 4-H area and 43 per cent on the Sanctuary area for the past winter. Hunting was prohibited on the 4-H area this winter, and a reduced mortality was expected. During the previous 4 years the winter mortality averaged 79 per cent of the fall population, and the hunters bagged an average of 47 per cent of that mortality. The crippling loss study indicated that at least 10 per cent of the fall crop was lost to this cause. Applying these statistics to the fall population of 1960 (309 rabbits), a winter mortality of only 22 per cent of the fall crop would be expected due to causes other than hunting. Actually, the winter mortality, without hunting, was 48 per cent of the fall population. This means that 26 per cent more rabbits died of natural causes this winter. The curtailment of hunting did not save 57 per cent of the rabbits' lives, but, instead, only 31 per cent. The results are not surprising in view of the phenomenon of density-dependent mortality factors. Rabbits which are removed by hunters decrease the probability of surviving rabbits dying from density-dependent natural causes of death, such as contagious disease or predation.

W-55-R-5

F. C. Bellrose

Five aerial surveys of waterfowl populations were made in March of 1961 on these dates: 1, 9, 15, 24, and 29. Because of bad weather for flying, it was impossible to cover the Illinois and Mississippi river valleys at weekly intervals.

By March 1, the northward movement of waterfowl was getting well underway with mallards numbering 160,000; pintails, 29,000; and canvasbacks, 17,000. Peak numbers of these early migrating species were reached on March 9, when there were 184,000 mallards, 27,000 pintails, and 17,000 canvasbacks. By the end of the month, mallard numbers had declined to 42,000, pintails to 2,600, and canvasbacks to 9,000.

The principal flight of northward bound lesser scaups arrived on March 23. On the following day we estimated 265,000 in both river valleys, and, by March 29, this number had risen to 340,000.

W-56-R-5

R. J. Ellis, T. U. Meyers

Illinois trapper returns and furbuyer reports for the 1960-61 fur season were analyzed. Ninety-eight per cent of the reporting trappers took furbearers. The average catch in this successful group was 65 furbearers. Muskrats made up 89.1 per cent of their catch, raccoons 6.2 per cent, and mink 2.6 per cent. Small numbers of opossums, foxes, skunks, and weasels were taken.

The average prices paid for mink, muskrat, skunk, and weasel pelts were

lower than during the preceding season (Table 2), but were higher on beaver, red and grey foxes, and opossums. Prices received for raccoons remained essentially the same as they were the previous season.

Efforts to reduce raccoon numbers on the Allerton Park study area were continued. Such reduction will permit studies of raccoon population behavior and ecology at a low population level. The effectiveness of control efforts can also be studied. All indices suggest that the resident raccoon population is now low. Only 7 raccoons were captured during a 35-day trapping period in late February and March when 2,962 trap nights were employed.

During the past 3 years, attempts were made to control raccoon predation on wood duck nests located in natural cavities of trees on the study areas. A gummy substance called "tanglefoot" initially was applied to the trunks of one-fourth of the trees being studied. During 1958 and 1959, it was 100 per cent effective. However, it was only 80 per cent effective in 1960.

The cost of tanglefoot is approximately \$3.00 per tree each year and the application must be repeated annually. It is thought that a metal band 14 inches wide would be as effective as tanglefoot, and it costs only 1/15th as much. To test the idea such bands were put on 30 trees during March.

Sixty cavities in trees were investigated during March. The remains of a wood duck hen were found in one cavity. Associated raccoon hair suggested that the hen may have been killed and partially eaten by the raccoon. Five raccoons were found in the cavities. Examination of the same cavities in 1960 disclosed 12 raccoons.

Table 2.-- Average prices received for Illinois pelts, 1957-58 season through the 1960-61 season.

Species	1957-58	1958-59	1959-60	1960-61
Mink	\$10.23	\$11.05	\$12.18	\$9.44
Beaver*	4.69	4.59	4.64	7.86
Raccoon	.91	.77	1.38	1.41
Skunk	.79	.80	.82	.69
Muskrat	.71	.68	.85	.70
Weasel	.43	.57	.63	.55
Red Fox	.21	.33	.79	.96
Opossum	.13	.15	.34	.53
Grey Fox	.11	.20	.48	.65

*Beaver prices are for 1957, 1958, 1959, and 1960 seasons.

pheasants from east-central Illinois were released on the Neoga area in the winter of 1959-1960. The following measurements were recorded from each bird prior to their release: body weight, length of the upper mandible, width of the upper mandible at the nares, wing length, middle toe length, and length of a central tail feather. A t test was employed to determine if significant differences existed between the mean measurements of morphological characters of juveniles of the same sex of both strains. Differences between the means were significant at the 0.05 level for all measurements except for bill length. In all cases, except for body weight, mean measurements from the "California" pheasants were smaller than comparable mean measurements from wild-trapped pheasants. According to the Rules of Bergman and Allen, the size difference between the two strains of pheasants suggests that the progenitors of the "California" birds could have originated in a more northern latitude than those of the pheasant that has become established in east-central Illinois. This latter statement is contradictory to fact and may reflect maturity and nutritional differences between game farm and wild reared birds, thereby masking true morphological differences between the two strains.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

April, 1961

Vol. 4, No. 4

W-30-R-14

R. F. Labisky, R. I. Smith

Fifty pheasants were trapped by night-lighting and marked with plastic back-tags during the first week of April on the Sibley area. These birds, all trapped within a 40-acre hayfield, will be observed throughout the spring and summer, and eventually some of the broods produced by this group will be trapped and marked for the purpose of studying dispersal of members of the brood.

Crowing counts have been conducted over a standard 20-mile route twice each week. Behavior and movement of marked pheasants have been observed and recorded as the spring dispersal from winter concentration areas occurred. The Sibley area pheasant population remains at a relatively high level, and the ice and snow storm of April 16 caused no serious mortality.

W-42-R-10

R. D. Lord, Jr., D. A. Casteel

The radio tracking system for rabbits has been developed and is now operational. Two rabbits have been equipped with transmitters and have been successfully tracked on the Allerton 4-H area. Preliminary results show considerably less wandering than might have been suspected on the basis of trap records.

The second year of the long-term project designed to determine regional and yearly differences in mortality rates of cottontails by collecting eyes during the hunting season resulted in an increase in the total number of eyes received over the previous year. During the first year 909 eyes were received; this year the number was 1,659. Twenty-six counties were represented in the sample for each year; however, the counties were not the same for each year. Examination of the data and corollary data from the rural mail carrier census of rabbits made in 1958 suggested that for the purpose of analyzing cottontail mortality the state may be divided into three parts: (1) the prairie counties, (2) the southern counties, and (3) the western and northwestern counties. The following table shows the average age in months of rabbits in the three regions for the first two years of this study.

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Table 1. --Average age of cottontail rabbits from hunters' samples.

Region	1959-1960		1960-1961		Total	
	Average Age (months)	Number	Average Age (months)	Number	Average Age (months)	Number
South	9.97	322	8.50	1,161	8.82	1,483
Prairie	8.57	198	7.05	109	8.03	307
West and Northwest	8.63	389	7.90	196	8.39	585
TOTAL	9.09	909	8.31	1,466	8.61	2,375

It is apparent that rabbits live longest in the southern part of the state, while the shortest survival rate is experienced in the prairie counties. Also, it appears that there was a general decrease in the average age of rabbits in all three regions from the first to the second year. This decrease in average age was caused by an increase in the mortality rate between the first and the second year. This means that, at least last year, the rabbit population was on the downhill side of the population cycle. With several additional years of data, prediction of state-wide population levels should be possible.

An interesting fact noted this year was that although the total number of eyes received was greater than last year, the number of eyes received from cooperating hunters decreased markedly. Only the action of several conservation officers saved the program and their action pointed the way to the future success of this project. In the future all conservation officers in the state will be furnished with a rugged container for collecting rabbit eyes during the season. The container will be filled with the preservative.

W-55-R-5

F. C. Bellrose

Three aerial surveys of waterfowl populations in the Illinois, Mississippi, and Rock River valleys were made during April. As a result of inclement flying weather, censuses were made at intervals slightly greater than one week: April 7, 18, and 26.

Ducks were over twice as abundant in the Mississippi River valley as in the Illinois River valley during this period. Surprising numbers of ducks were found concentrated on a few temporary ponds and a few permanent marshes in the lower Rock River valley. The density of ducks was greater there than in the Mississippi River valley.

During April, peak numbers of green and blue-winged teals, widgeon, gadwall, shoveler, lesser scaup, and coot occurred. By the last census on April 26, the population of all species but the blue-winged teal, lesser scaup, and coot had declined to a few thousand. Although 13,000 lesser scaups and 10,000 coots were still present near the end of April, they had declined markedly from the 380,000 scaups and the 30,000 coots present at the peak of the spring migration.

W-56-R-5

R. J. Ellis, T. U. Meyers

Raccoons and opossums were removed from the Allerton Park study area during the periods of September 1 to October 31, 1960 and February 20 to March 31, 1961. Raccoon hunters and mink trappers supplemented this effort by removing 6 raccoons from the area during the hunting and trapping seasons. A total of 27 raccoons and 67 opossums were removed from the area by all means between September 1, 1960 and March 31, 1961. Between February 20 and March 31, 1961, 2,962 trap nights were employed. Yet only 7 raccoons and 11 opossums were caught. These results and a paucity of fresh signs indicated that the raccoon and opossum populations on the area were quite low by the end of March.

Following the period of population reduction, an attempt was begun to determine the resulting effects on raccoon and opossum movements and population recovery. Sixty live traps were set on the study area on April 6. By April 22 only 1 raccoon and 3 opossums had been caught. The raccoon escaped and no information was obtained. The opossums were all females carrying 6 to 12, or an average of 10, young each. This is nearly 2 more per litter than the average for the preceding 4 years. If the sample were larger, the increased litter size could be interpreted appropriately to indicate an anticipated response to the low population level.

W-61-R-4

J. Ellis, J. Harper, W. Anderson

Three-hundred "California" pheasants (all juvenile hens) and 300 wild-trapped pheasants (50 cocks, 9.0 young per adult: 250 hens, 1.72 young per adult) were released on the Neoga area during the past winter. As of April 27, 21.5 per cent of these released pheasants have been found dead. Wild-transplanted pheasants comprised 51 per cent of these mortalities. Age ratios among the wild-transplanted pheasants that have died was 10 juveniles per adult for cocks and 1.08 juveniles per adult for hens. Thus, the wild-transplanted adult hens have died at a more

The first part of the paper discusses the importance of the study and the objectives of the research. It also mentions the scope of the study and the limitations of the study.

The second part of the paper discusses the methodology used in the study. It mentions the data sources and the data collection methods used in the study.

The third part of the paper discusses the results of the study. It mentions the findings of the study and the conclusions drawn from the study.

The fourth part of the paper discusses the implications of the study. It mentions the practical implications of the study and the theoretical implications of the study.

The fifth part of the paper discusses the limitations of the study. It mentions the limitations of the study and the limitations of the study.

The sixth part of the paper discusses the conclusions of the study. It mentions the conclusions of the study and the conclusions of the study.

The seventh part of the paper discusses the future research. It mentions the future research and the future research.

accelerated rate than juvenile hens of the same source. At the present time, no explanation can be offered for this differential mortality.

Pheasants hatched on the area in 1960 were observed more frequently during April, 1961, than wild-transplanted and "California" pheasants that were released during the past winter.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

May, 1961

Vol. 4, No. 5

W-30-R-14

R. F. Labisky, S. H. Mann, C. B. Mack

It is generally an accepted fact that the cock pheasant selects the territory site or location and that the majority of the harem of hens is acquired after establishment of the territory. However, a limited amount of evidence obtained from the study of marked pheasants on the Sibley area during the past 5 years suggests that the role of the cock in territory selection may have been over-emphasized. Our data indicate that many adult hens (that is, hens that have experienced one or more breeding seasons) establish and utilize a specific area of land early in the breeding season, prior to any constant association with a cock. Eventually a cock will join this group of hens and will establish the territory within or near the area previously utilized by the hens. Young hens (that is, hens about to enter their first breeding season) often become members of the preterritory unit of hens prior to the appearance of the cock, and additional hens, both young and adult, may join the harem after the cock has arrived and established the territory. Thus, a particular hen may be associated with the same territory (many times regardless of changes in habitat) for as many breeding seasons as she survives. Several marked hens on the Sibley area have been associated with the same territory area for at least three breeding seasons. Many young hens, associated with a particular territory during their first breeding season, have also been observed to return to the same territory in subsequent years.

W-42-R-10

R. D. Lord, Jr., D. A. Casteel

At the end of April, three male and three female rabbits which had been kept in individual cages were released in the rabbit-proofed enclosure. These rabbits immediately bred. Thirty days later all three deposited litters in separate nests. Advantage was taken of this opportunity to set up recording switches at each nest to record time and duration of nest attendance by the females. These switches are now in operation.

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THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY
RESEARCH REPORT
No. 10, 1955

BY J. H. GOLDSTEIN AND R. L. WATKINS

RECEIVED BY THE DEPARTMENT OF CHEMISTRY, UNIVERSITY OF CHICAGO, MAY 10, 1955

The infrared spectra of a series of substituted benzenes have been studied in the region 1500-1700 cm⁻¹. The results show that the carbonyl group in these compounds is in a conjugated state. The infrared spectra of these compounds are compared with those of the corresponding non-conjugated compounds. The results show that the carbonyl group in the conjugated compounds is in a more conjugated state than in the non-conjugated compounds. The results also show that the carbonyl group in the conjugated compounds is in a more conjugated state than in the non-conjugated compounds. The results also show that the carbonyl group in the conjugated compounds is in a more conjugated state than in the non-conjugated compounds.

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Six new transmitter radios for rabbits were constructed during the month and much work was done on improving the receiver. A test was made of the transmitter adapted for use on mallard ducks (in cooperation with Frank Bellrose); the range achieved was 22 miles.

W-56-R-5

R. J. Ellis, T. U. Meyers, G. C. Sanderson

Since 1958 raccoon predation on wood duck nests on the study areas has been combated by placing a band of "tanglefoot" around the tree and below the nest cavity. This year a band of metal 1 1/4 inches wide was substituted for "tanglefoot" on 30 trees. The metal is less expensive and possibly more effective than "tanglefoot."

Five cavities located in trees banded with metal bands were used by wood ducks for nesting. Fox squirrels destroyed three of these nests, but raccoons destroyed none. The cavities in the banded trees probably are more accessible to squirrels than to raccoons because, although the cavities may be protected from below, they are not protected from above. An animal entering the crown of a banded tree could approach the cavity from above. Because squirrels are more agile than raccoons in moving on branches from one tree to another, they probably are less affected by protective devices below the cavities.

This year 126 natural cavities judged to be suitable for wood duck nesting were located on the study areas. Wood ducks nested in 22 of these. One of the nests hatched, eight are being incubated, seven were destroyed by fox squirrels, five were destroyed by raccoons, and one was destroyed by wind damage to the tree.

During May, raccoons weighing approximately 8 pounds were found in tree cavities with entrances too small to admit normal-sized adult raccoons. The greater number of small raccoons this year appears to be a result of a delay in the 1960 breeding season which was caused by abnormally severe winter weather during much of the raccoon's normal breeding season in 1960.

Data collected during the past six breeding seasons in the northern half of Illinois indicate that most raccoons are born during April in this section of the state. The mean date of birth for 19 litters conceived in the wild, six of which were born in captivity, was April 14; the earliest date of birth was March 9 and the latest June 10. Birth dates for young not born in captivity were estimated by measuring the uterine swellings and comparing their sizes with the sizes of uterine swellings of embryos of known ages.

The mean date of birth for 11 litters conceived and born in captivity, in Urbana, Illinois, was April 24. The earliest date of birth for a litter conceived in captivity was March 16, and the latest was June 3.

100

The first part of the paper is devoted to a general discussion of the problem of the origin of life. It is shown that the problem is one of the most important and interesting in the history of science. The author discusses the various theories of the origin of life, and shows that the most probable one is the theory of spontaneous generation.

The second part of the paper is devoted to a detailed discussion of the theory of spontaneous generation. It is shown that this theory is based on the fact that life is a complex of many different parts, and that these parts are all derived from a common ancestor. The author shows that this theory is the only one that can explain the origin of life.

The third part of the paper is devoted to a discussion of the evidence in favor of the theory of spontaneous generation. It is shown that there is a great deal of evidence in favor of this theory, and that it is the only one that can explain the origin of life. The author shows that the evidence is of two kinds: first, the evidence of the fossil record, and second, the evidence of the present-day world.

The fourth part of the paper is devoted to a discussion of the objections to the theory of spontaneous generation. It is shown that there are many objections to this theory, but that they are all based on a misunderstanding of the facts. The author shows that the theory of spontaneous generation is the only one that can explain the origin of life.

The fifth part of the paper is devoted to a discussion of the conclusions of the author. It is shown that the theory of spontaneous generation is the only one that can explain the origin of life. The author shows that the evidence is of two kinds: first, the evidence of the fossil record, and second, the evidence of the present-day world.

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W-61-R-4

J. Ellis, J. Harper, W. Anderson

Audio-censuses and observations of pheasants on the Neoga area indicate that the breeding population on the area this spring is composed of 308 birds (88 cocks and 220 hens). This estimate is 25 per cent lower than the estimated breeding population on the area in 1960. The decline has occurred even though 550 hens and 50 cocks were released on the area during the past winter. The breeding population is composed of pheasants from three sources in the following proportions. Numbers in parentheses are per cent of totals.

Origin	Cocks	Hens	Total
"California" *	No cocks released	52(23.5)	52(16.9)
Wild-transplanted*	10(11.4)	78(35.6)	88(28.6)
"Native"**	78(88.6)	90(40.9)	168(54.5)
Total	88(28.6)	220(71.4)	308(100.0)

*Released on the area during the winter of 1960-61.

**Released on the area during the winter of 1959-60 and their progeny.

These figures indicate that mortality among "native" hen pheasants from the fall of 1960 to the spring of 1961 was between 74 and 79 per cent. Winter mortality of this magnitude is not characteristic of a thriving pheasant population.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

June, 1961

Vol. 4, No. 6

W-30-R-14

R. F. Labisky, S. H. Mann

The crowing of cock pheasants on the Sibley area reached maximum frequency between May 4 and 7 in each of the five years, 1957 through 1961. This precise timing of maximum crowing occurred in spite of variations in weather conditions in these years. Such precision suggests a constant control mechanism. Weather factors, such as precipitation, temperature, or sunlight, would not provide such constancy. It would appear that photoperiod, and not light intensity per se, must be involved in the regulation of crowing by cocks. This is to say that increasing photoperiod associated with increasing day length or the decreasing ratio of dark to light may reach an "optimum" at which time maximum crowing occurs. It is possible that the photoperiod stimulus acts neurohumorally through the hypothalamus to release gonadotropic hormones (GTH) necessary for testicular recrudescence and subsequent production of androgen, which is ultimately responsible for crowing. Some aspect of increasing photoperiod may reach a critical level after early May (for the Sibley area) and would then tend to act as a depressor, inhibiting the release of GTH. However, until refined crowing-count data become available for areas with latitudes different than that of Sibley it will be impossible to ascertain the role of the photoperiod in regulating the crowing of cock pheasants.

Should the photoperiod factor be responsible in regulating crowing of cocks, it would become feasible to predict the peaks of crowing by cocks on different areas (by computation of the photoperiods at different latitudes). If the period of maximum frequency of crowing could be determined for each area, much less time and money would be expended by biologists in obtaining reliable call counts of pheasants each spring.

W-42-R-10

R. D. Lord, Jr., D. A. Casteel

The nest attendance records taken automatically on two cottontail nests in our enclosure showed that each female spent most of the first night following the night of birth at the nest, presumably nursing their young. Then neither rabbit

visited her nest for some time. In one case this was 55 hours and in the other it was 22 hours. Thereafter each rabbit visited her nest for variable intervals, usually during the day. The nests were seldom visited after dark. The young left the nest at 10 days of age in one case and at 11 days in the other case. The calculated gestation for both females was 28 days.

A paper was given by the project leader and William Cochran of the Electrical Engineering Department of the University of Illinois at the annual meeting of the American Society of Mammalogists held this year in Urbana. The subject of the paper was the use of small radios for tracking mammals. A demonstration of the radio tracking system was given to the Society at the Robert Allerton Park study area.

W-55-R-5

F. C. Bellrose

Project inactive in June.

W-56-R-5

R. J. Ellis, T. U. Meyers

During the 1960-61 fur season, Illinois furbuyers provided 3,247 raccoon penis bones. Approximately 35 per cent of these came from animals more than one year old. The remainder represented younger animals. These data suggest a population age ratio of 1.8 juvenile males per adult male.

The sex ratio of 953 raccoons examined at fur houses during the past fur season was 1.1 females per male. The age ratio of the females in this group was 1.8 juveniles per adult. In the case of males examined at these same fur houses the age ratio was 2.3 juveniles per adult. When both sexes are combined the ratio is 2.0 juveniles per adult. This is not greatly different from the age ratio of the males discussed in the preceding paragraph. In both cases it suggests a rather stable population.

The age ratios discussed above indicate that with respect to production of young, the 1960 season was nearly average. It is significant to note that this occurred even though mating had been delayed significantly by the abnormal winter weather which occurred during the usual mating season.

Nine raccoon litters were observed in the wild on the raccoon-wood duck study area near Havana. The average number of young per litter was 4.7. Three of the mother raccoons were so small that it is believed they were "yearling" females that were younger than average during the mating season in 1961 as a result of the delayed 1960 mating season. Such observations indicate that short-age yearling females may breed during their first year.

W-61-R-4

J. Ellis, J. Harper, W. Anderson

During June, 169 adult pheasants were observed on the Neoga area. Of these, 124 (75 per cent) were identified as having been produced on the area in 1960, 38 (23 per cent) were wild-transplanted birds released on the area last winter, and 3 (2 per cent) were "California" pheasants also released last winter. In 1960 "California" pheasants were observed less frequently than wild-transplanted pheasants during the period April through June.

A total of 33 pheasant nests have been found on the area this summer; two of these nests had hatched. The origin of the hens associated with 15 of the nests was determined. Eight were produced by "native," five by wild-transplanted, and two by "California" hens. Average clutch size for 13 incubated nests was 10.8 eggs.

By July 1, 1960, 53 pheasant nests had been found on the area. The reduction in the number of nests located this year was believed caused by: (1) the breeding population on the area this year is smaller than last year, and (2) the Federal Feed Grain Program has increased the acreage of unmowed hay on the area, and most nests are found by searching mowed hayfields.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

July, 1961

Vol. 4, No. 7

1. Pheasant Populations and Land Use

R. F. Labisky, S. H. Mann

The number of pheasant broods observed along the standardized transect routes on the Sibley area during July, 1961, was nearly identical to the number of broods observed during July, 1960, but was about 58 per cent greater than the number of broods recorded during July, 1959. Eighty-three, 82, and 52 broods were observed along 320 miles of roadside transect driven during July of 1961, 1960, and 1959, respectively. The mean age of the broods observed was 4.7 weeks in 1960 and 5.3 weeks in 1961, indicating a slightly earlier hatch of chicks in 1961. The number of unhatched nests and the rate at which nests are still being found suggest that the peak of hatch may not be reached until some time in August even though in previous years it occurred in late June or early July.

2. Manipulation of Pheasant Habitat

Project inactive in July. A search is being made for a suitable project leader.

3. Extension of Pheasant Range

J. A. Ellis, W. L. Anderson, J. Harper

During July, 56 adult pheasants were observed on the Neoga area. Of these, 46 (82 per cent) were birds that were produced on the area in 1960 ("native" pheasants) and 10 (18 per cent) were wild-transplanted pheasants that were released on the area during the past winter. None of the "California" pheasants that were released on the area during the past winter were observed.

Even though the estimated breeding hen population was 25 per cent lower in 1961 than last year, brood production appears to be about the same for the two years. Thus far, 50 individual pheasant broods have been located on the Neoga area this year; on this date in 1960, 48 individual broods had been located. This increase in productive effort is a reflection of the higher per cent of successful hens this year than in 1960. During July of this year, 74 per cent of the hens observed were accompanied by broods; while during July and August, 1960, 56 per cent of the hens observed were accompanied by broods. The data tentatively suggest that nesting success this year is 33 per cent higher than in 1960.

The origin of the hens producing 34 of the 50 broods was determined. Twenty-nine (85 per cent) were produced by "native" birds and 5 (15 per cent) by wild-trapped hens that were released on the area this past winter.

Complete counts of chicks and accurate aging was possible for 28 of the 50 broods. The broods ranged in size from 3 to 13 chicks and in age from 1 to 8 weeks. Average brood size was 7.7 chicks at an average age of 4.9 weeks.

4. Rabbit Management

R. D. Lord, D. A. Casteel

Tabulation of a voluminous amount of activity data taken on caged rabbits from April 1, 1960, to March 31, 1961, was completed this month. Analysis of these data has just begun; however, it is already apparent that with only a few significant differences, the results of this detailed study closely parallel those obtained through the roadside census technique. In the roadside study of seasonal changes in activity of cottontails, the peak of activity occurred at the population low in April. The caged rabbits showed a similar peak of activity in April. Thus, these findings emphasize the point that the number of rabbits seen along roads is far more indicative of their activity than of their numbers. The peak of rabbit abundance occurs in June and July, but by this time the activity of the rabbits has begun to decline showing far fewer rabbits on the roads.

The roadside census of rabbit activity shows the low point in the annual cycle to be in September. In caged rabbits the low point in annual activity came in January. This point also sheds light on the factors affecting roadside censuses. With the coming of winter rabbits become far more visible due to the effects of weather on the dead vegetation. Of course, a background of snow makes them easily seen. Thus, the roadside census figures show an increase during the winter even though both the population and the activity of rabbits is on the decline.

5. Investigations of Furbearers

R. J. Ellis, T. U. Meyers

Since March 1, 1961, 125 natural cavities in trees and judged to be suitable for wood duck nesting were found on the study area near Havana. An attempt was made to protect 25 (20 per cent) of the cavities by placing sheet metal bands 14 inches wide around the trees and below the cavities.

All cavities were inspected at regular intervals of 7 to 10 days. The findings are presented in table 1. These data show that the metal bands effectively protected the nests from raccoons but not from fox squirrels. Unlike raccoons, fox squirrels easily move from tree to tree through the branches and thereby are able to reach the cavities from above.

Table 1. Fates of thirty-two wood duck nests observed in natural tree cavities near Havana, March through June, 1961.

Fate of Nests	Number Nests Affected			
	Nests Not Protected by Metal Bands		Nests Protected by Metal Bands	
Hatched	7	(28.0)*	3	(43)
Deserted	2	(8.0)	0	
Destroyed by raccoons	10	(40.0)	0	
Destroyed by fox squirrels	5	(20.0)	4	(57)
Destroyed by tree damage	1	(4.0)	0	
Total	25	(100.0)	7	(100.0)

*Numbers in parentheses indicate percentage of the total.

6. Waterfowl Inventory

F. C. Bellrose

Project inactive in July.

7. Wildlife-Insecticide Relationships

R. W. Lutz

Routine observations on the effect of aldrin on wildlife were made in Iroquois County where the Plant Pest Control Branch of the U. S. Department of Agriculture and the Division of Plant Industry of the Illinois Department of Agriculture are continuing an effort to eliminate a local infestation of Japanese beetles.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

August, 1961

Vol. 4, No. 8

1. Pheasant Populations and Land Use

R. F. Labisky, S. H. Mann

The standardized counts of pheasant broods taken on the Sibley area during July and August, 1961, revealed the highest number of broods recorded during the past 5 years, the period of time for which comparable data exist. The number of broods observed along 640 miles of roadside transect (2, 40-mile routes driven weekly) increased from 235 broods in 1960 to 285 broods in 1961, or 21.3 per cent. Comparable counts for 1957, 1958, and 1959 were 194, 240, and 198 broods, respectively.

The number of adult pheasant hens observed during July and August along these same 640 miles of roadside increased from 348 hens in 1960 to 478 hens in 1961, or 37.4 per cent, indicating a substantial increase in the population of breeding hens in 1961. A total of 38.2 per cent of the adult hens observed in 1960 were broodless compared to 43.5 per cent in 1961, a proportional 13.9 per cent increase in the number of broodless hens observed in 1961, thus reflecting slightly poorer nesting success. By combining the 21.3 per cent increase in the number of broods, representing brood hens, and the 13.9 per cent increase in the proportion of broodless hens, 34.2 per cent of the 37.4 per cent increase in the 1961 population of breeding hens can be accounted for with respect to annual productivity.

2. Manipulation of Pheasant Habitat

Project inactive in August.

3. Extension of Pheasant Range

J. A. Ellis, W. L. Anderson, J. Harper

During August, 40 adult pheasants (19 cocks and 21 hens) were observed on the Neoga study area. Thirty-two (80.0 per cent) were birds that were produced on the area in 1960 ("native" pheasants), and eight (20.0 per cent) were wild-transplanted pheasants that were released during the past winter. None of the "California" pheasants released during the past winter have been observed since June 5.

Brood production was lower in 1961 than in 1960, but productivity was higher. The number of broods produced during each year was estimated by subtracting the known hen mortality during the nesting season from the estimated number of hens present at the onset of the breeding season and multiplying by the per cent of hens accompanied by broods during July and August. An estimated 128 broods were produced in 1960 and 105 in 1961. These data suggest that brood

production in 1961 was down 18 per cent from 1960. Brood counts support the above estimates of brood production. In 1960, 4.12 broods were observed per 100 miles of driving, while in 1961, 3.24 broods were observed, suggesting that brood production in 1961 was 21.4 per cent less.

Productivity was greater on the area in 1961 than in 1960. During July and August of 1961, 74.1 per cent of the adult hens observed were accompanied by broods whereas during the same period in 1960, 55.7 per cent of the hens observed were accompanied by broods, indicating that the per cent of broodless hens was down 24.8 per cent from 1960 to 1961. In 1960, the average size of 52 broods for which the count of chicks was considered to be complete was 7.4 chicks at an average age of 7.1 weeks. In 1961, the average size of 38 broods was 8.5 chicks at an average age of 6.7 weeks.

During the month, 300 soil samples were collected, 200 from the Sibley study area and 100 from the Neoga study area. Each sample was washed through soil analysis screens to remove gravel. The gravel was separated as to size and weighed. Average weight of the gravel collected from Sibley was 13.1 grams per sample and from Neoga 13.9 grams per sample. Thus, very little difference exists between the two study areas in regard to available grit.

4. Rabbit Management

R. D. Lord, D. A. Casteel

The Project Leader was on annual leave in the month of August.

Two, 100-acre study areas have been established on private lands in Hancock County. The areas are presently being manipulated (clearing square-acre grid lines) to facilitate censusing and trapping. The fall trapping session was begun in the last week of August.

5. Investigations of Furbearers

R. J. Ellis, T. U. Meyers

Between March 1, 1957, and June 29, 1961, 221 raccoons were captured, marked, and released on the Piatt County study area. Prior to June 29, 1961, 120 (35.2 per cent) of these were recaptured, sometimes by hunters. In the case of each raccoon captured four or more times within any 12-month period, the geographical center of all capture sites, the "estimated center of activity," was calculated. The average distance traveled by each raccoon from its estimated center of activity to the capture sites was then calculated and later used as an index to the extent of the movements of that animal. The results of the analysis are presented in table 1.

The tests suggest that the extent of movements of raccoons did not differ appreciably between animals of different sex or age; however, a more adequate sample may reveal a significant difference between the movements of adults and juveniles. The data indicate a significant difference in the extent of movements between animals which were captured by hunters and those which were not. This significance is difficult to interpret because the live-trapping was restricted to the study area, but the hunters and raccoons were not. Thus, an estimate of the movements of a raccoon whose center of activity was located on or near the boundary of the study area would be smaller when based on live-trapping data than when based on live-trapping data plus hunter-capture records.

Table 1.-- Average distances traveled from the estimated centers of activity by raccoons captured four or more times within 12-month periods on the Allerton Park study area, Piatt County, Illinois, March, 1957 through June, 1961. Distances are in feet.

	Sample Size	Average Distance Traveled From Estimated Center of Activity (feet)	Statistical Significance of Difference*
Killed by hunters	8	1,989.2**	Significant
Not killed by hunters	14	812.7	
Males	10	1,296.3	Not Significant
Females	12	1,194.2	
Adults	6	1,638.2	Not Significant
Juveniles	16	1,091.6	
All Raccoons	22	1,240.6	

*Student's t-test, .05 confidence level.

**Includes all movements recorded for each animal.

6. Waterfowl Inventory

F. C. Bellrose

Project inactive during August.

7. Wildlife-Insecticide Relationships

R. W. Lutz

Pheasant brood counts were conducted on the Donovan, Beaverville, and Iroquois areas during July and August. The Donovan and Iroquois areas were treated with 2 pounds per acre of aldrin during the spring of 1960 and 1961, respectively; the Beaverville area was not treated.

Thus far, 45 pheasant broods have been observed along 628 miles of roadside transect on the Donovan area in 1961; 25 broods were observed on a 789-mile transect on this area in 1960 following treatment. Fifty-seven broods have been observed along a 628-mile transect on the Beaverville area in 1961 as compared to 35 broods on a 758-mile transect in 1960. Nineteen broods have been recorded along 758 miles of roadside transect on the Iroquois area following treatment in 1961; observations were not made on this area in 1960.

The number of pheasant broods observed per mile on the Donovan area in 1961 is 126.2 per cent greater than in 1960, and the number of broods observed on the Beaverville area is about 96.6 per cent greater than in 1960.

Eighty per cent of the hens observed on the Beaverville area, and 81.4 per cent of the hens seen on the Donovan area this year were accompanied by broods;

while on the Iroquois area, only 54.5 per cent of the hens observed were accompanied by broods. During 1960, approximately 60 per cent of the hens observed on each of the Donovan and Beaverville areas was accompanied by broods.

The average brood size for all ages, for those broods for which complete counts were possible, on the Donovan, Beaverville, and Iroquois areas was 6.8, 7.2, and 7.1 chicks, respectively. During 1960, the average brood size was 5.4 chicks on the Donovan area as compared to 7.1 chicks per brood on the Beaverville area.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

September, 1961

Vol. 4, No. 9

1. Pheasant Populations and Land Use

R. F. Labisky, S. H. Mann

Field investigations of pheasant nesting and its relation to land use on the intensively cultivated Sibley area have been completed for 1961. The 100 randomly selected 10-acre study plots (representing a 4.3 per cent sample of the 23,200-acre study area) that were searched for nests in 1957, 1958, 1959, and 1960 were again searched in 1961. In 1961, 437 nests were located, and 110 (25.2 per cent) of these nests hatched. The number of hatched nests (110) recorded in 1961 was 29.4 per cent greater than the number of hatched nests (85) reported in 1960, and also represents the greatest production of hatched nests during the past 5 years, (Table 1).

Table 1.-- Densities of established and hatched pheasant nests, Sibley area (east-central Illinois), 1957-61.

Years	Densities: Nests per 100 Acres of Land Area	
	Nests Established	Nests Hatched
1957	12.4*	4.2
1958	26.6	7.9
1959	23.6	5.6
1960	28.0	8.5
1961	43.7	11.0

*Samples sizes (number of nests) can be obtained by removing decimal points in all figures.

2. Manipulation of Pheasant Habitat

Project inactive in September.

3. Extension of Pheasant Range

J. A. Ellis, W. L. Anderson, J. Harper

The midpoint (50 per cent point) in the hatch of pheasant nests on the Neoga area, Cumberland County, occurred between June 11 and June 25. The June 11 date of hatch was obtained by backdating from the ages of 62 pheasant broods which were aged in the field to the times of hatching. The later midpoint of hatch, June 25, was obtained by calculating the potential hatching dates of 20 unhatched

nests which had been incubated, and by backdating to hatching 42 young pheasants captured by night-lighting, and aged according to the succession of their molt of primary flight feathers, during September. A similar disagreement in the timing of the midpoint of hatch occurred in 1960. Apparently broods hatched later in the nesting season are not as readily observed as those hatched earlier in the season.

To determine the presence of calcareous grit in gizzards of pheasants that were collected on an area (Sibley) that was recently glaciated as opposed to an area (Neoga) not recently glaciated, grit was removed from 178 pheasant gizzards that were collected on the Sibley and Neoga study areas during the past few years. Gizzards (128) collected on the Sibley area represented all months of the year except September, whereas gizzards (50) collected from pheasants on the Neoga area represented only 6 monthly periods. Chemical analyses revealed that calcareous grit comprised 4.0 per cent of the total grit removed from Sibley birds compared to 7.5 per cent from Neoga birds. During the nesting season (April, May, and June), 10 per cent of the grit removed from the gizzards of hens collected at Sibley and 9.6 per cent of the grit removed from the gizzards of hens collected at Neoga was calcareous. These data tentatively suggest that pheasants are obtaining calcareous grit on both areas, and possibly refute the hypothesis that a deficiency of calcium is a factor limiting the distribution of pheasants in Illinois.

4. Rabbit Management

R. D. Lord, D. A. Casteel

The two Allerton Park study areas and the two McDonough County study areas were prepared for the beginning of the fall trapping by clearing and mowing grid lines. Trapping was begun in the middle of the month and has proceeded satisfactorily on all areas. Aerial photographs were made of the Allerton areas, but overcast conditions prevented aerial photography of the McDonough County areas. A total of ten radio transmitters for use in tracking rabbits were constructed, and the first draft of the publication describing the radio tracking system has been completed. The project leader has received an unusually large number of letters of inquiry concerning this system which, of course, has application to other species of wildlife.

5. Investigations of Furbearers

Ralph J. Ellis

The nocturnal movements of a juvenile female raccoon were determined at intervals during a two-week period in August, 1961, by using radio-tracking equipment. The results suggested that this animal was living on approximately 165 acres. Normally, this raccoon used only about 1 acre per night. However, she covered nearly half the estimated home range one night subsequent to being disturbed by hounds. It is probable that the movements of this juvenile also represent those of a family group because raccoon families normally do not disperse until late fall.

The radio-tracking evidence just discussed depicts a home range approximately three times as large as the average home range calculated from trapping data representing 22 animals of various ages on the same area. Possibly the raccoon

tracked by radio was unusually mobile. However, it appears more likely that this demonstrates the effect of the number of positions determined for the animal, whether radio fixes or trap captures, on the estimation of the size of the home range. Home ranges estimated from trapping data were based on animals captured an average of 5.4 times during any 12-month period. The one home range estimated from radio tracking was based on 17 "fixes" taken mostly during two nights in late August.

6. Waterfowl Inventory

F. C. Bellrose

Four aerial surveys were made of waterfowl populations in the Illinois and part of the Mississippi River valleys during September.

The first survey, on September 6, revealed seasonal populations of widgeon and blue-winged and green-winged teals. During the ensuing week floods occurred on the Illinois and Mississippi Rivers resulting in an exodus of both species of teal. With continued flooding in the Illinois River valley, the teal population remained abnormally low through September.

Apparently as a result of flooded fields, pintails have appeared in unusually large numbers in the Illinois River valley. However, in spite of flooded fields in the Sny Drainage in the Mississippi River valley south of Quincy, pintails have appeared there only in seasonal numbers.

7. Wildlife-Insecticide Relationships

R. W. Lutz

The project was inactive during the first two weeks of September.

During 1960, and September, 1961, snap-traps were utilized to determine shrew populations on the aldrin and untreated areas. The species known to be present on the study areas were the short-tailed shrew (Blarina brevicauda) and the masked shrew (Sorex cinereus). The data (Table 1) suggest that shrew populations on the aldrin area were sharply reduced in the months following treatment. Some recovery was evident on the aldrin area in 1961.

Table 1.-- Shrew populations on the aldrin and untreated areas as indicated by snap-trapping during April, June, and October, 1960, and September, 1961.

Months and Years	Aldrin Area		Untreated Area	
	Number of Trap-Nights	Number Per Trap-Night	Number of Trap-Nights	Number Per Trap-Night
1960				
April	2,985	.0023	2,250	.0031
June	3,000	.0000	2,220	.0023
October	3,000	.0000	2,220	.0036
1961				
September	600	.0033	600	.0133

Two roadside rabbit censuses were conducted on each of the study areas during September.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott and Wendy Patton, Editors

Urbana, Illinois

October, 1961

Vol. 4, No. 10

1. Pheasant Populations and Land Use

R. F. Labisky, S. H. Mann

Agricultural trends on the 23,200-acre Sibley study area have been toward progressively more acres of row crops (corn and soy beans) and correspondingly fewer acres of small grains and forage crops (tame hayfields and pastures). Pheasants have demonstrated (1) the ability to shift their nesting effort among the different cover types (particularly between small grains and tame hayfields) under the changing land-use program, and (2) the ability to concentrate nesting effort to compensate for the decline in the quantity and quality of nesting cover without sacrificing a high degree of hatching success.

In 1961, pheasants established 279.5 nests per 100 acres of hayfield cover and 29.7 per cent of these nests hatched. Densities of nests established in hayfields were 67.3, 117.4, 129.0 and 214.5 nests per 100 acres in 1957, 1958, 1959, and 1960, respectively. The percentage comparison of proportions of cover types and associated production of hatched nests for the 5 years, 1957-61, are presented in tables 1 and 2. The decline in the acreage of row crops and increase in the acreage of small grains in 1961 was the result of participation by farmers in the Federal feed-grain program.

Table 1. --Percentage comparison of the proportions of cover types on the Sibley study area, 1957-61. Data were collected from 100 randomly selected 10-acre plots comprising a 4.3 per cent sample of the 23,200-acre area.

Cover Types	Percentage of Total Cover					
	1957	1958	1959	1960	1961	5-Year Average
Row Crops	48.0*	54.4	60.6	64.0	58.8	57.2
Small Grains	22.4	14.5	17.2	10.0	18.5	16.5
Hayfields (tame)	8.6	15.9	8.2	8.3	8.3	9.9
Pastures	12.5	6.1	4.8	8.5	5.3	7.4
(tame and wild)						
Strip-Cover	4.6	4.8	4.7	4.8	4.7	4.7
Non-Agricultural	3.9	4.5	4.6	4.5	4.4	4.4
Total	100.0	100.2	100.1	100.1	100.0	100.1

* Actual sample plot acreages can be obtained by removing decimal points.

Table 2. --Percentage of hatched nests by cover types on the Sibley study area, 1957-61. Data were collected from 100 randomly selected 10-acre plots comprising a 4.3 per cent sample of the 23,200-acre area.

Cover Types	Percentage of Hatched Nests Contributed by Each Cover Type					
	1957	1958	1959	1960	1961	5-Year Average
Row Crops	0.0(0)*	0.0(0)	0.0(0)	0.0(0)	0.0(0)	0.0(0)
Small Grains	26.2(11)	8.9(7)	39.3(22)	14.1(12)	14.5(16)	18.3(68)
Hayfields (tame)	45.2(19)	73.4(58)	37.5(21)	63.3(54)	62.7(69)	59.4(221)
Pastures (tame and wild)	11.9(5)	10.1(8)	10.7(6)	5.9(5)	7.3(8)	8.6(32)
Strip-Cover	14.3(6)	6.3(5)	12.5(7)	12.9(11)	15.5(17)	12.4(46)
Non-Agricultural	2.4(1)	1.3(1)	0.0(0)	3.5(3)	0.0(0)	1.3(5)
Total	100.0(42)	100.0(79)	100.0(56)	100.0(85)	100.0(110)	100.0(372)

* Sample sizes (number of hatched nests found on sample plot acreages) in parentheses

2. Manipulation of Pheasant Habitat

Project inactive in October.

3. Extension of Pheasant Range

J. A. Ellis, W. L. Anderson, J. A. Harper

The night-lighting of pheasants on the Neoga area during September and early October, 1961, resulted in the capture of 76 previously unmarked birds. Each of the captured pheasants was marked with a numbered plastic back-tag to permit individual identification in the field.

One-hundred and forty-six pheasants were flushed and identified as to sex during 28.0 hours of actual night-lighting. Eighty-nine (including recaptures) or 60.8 per cent of the observed pheasants were captured. Eleven and three-tenths minutes of night-lighting were required to locate one bird and 18.8 minutes to capture one. In 1960, each observation and capture of a pheasant required 3.9 minutes and 10.8 minutes, respectively. It is apparent that the pre-hunt population is lower this year than in 1960.

The sex ratio among all pheasants observed showed cocks comprised 39.7 per cent of the pre-hunt population. Age ratios were 20.0 juveniles of both sexes per adult cock and 2.92 juveniles of both sexes per adult hen. These age ratios indicate that productivity on the area in 1961, though not excessive, was adequate to maintain the present population.

Gravel removed from soil samples collected in the Neoga and Sibley study areas was tested to determine the percentage of calcite (calcium carbonate) and dolomite (magnesium carbonate with varying amounts of calcium carbonate) present. The results are shown in table 3.

Table 3. --Per cent calcite and dolomite occurring in field grit collected on the Neoga and Sibley study areas. All calculations are based on the weight of the grit.

Size of Gravel	Neoga		Sibley	
	Per Cent Calcite	Per Cent Dolomite	Per Cent Calcite	Per Cent Dolomite
Over 5 mm	0.07	0.02	0.14	0.01
3 - 5 mm	0.15	0.06	0.15	0.02
2 - 3 mm	0.13	0.08	0.11	0.01
1 - 2 mm	<u>0.13</u>	<u>0.15</u>	<u>0.16</u>	<u>0.01</u>
Total	0.48	0.31	0.56	0.05

These results tentatively suggest that hens during the laying season either select their grit for calcium content or use something other than field gravel to meet their calcium requirements (See Monthly Wildlife Research Letter Vol. 4, No. 9).

4. Rabbit Management

R. D. Lord, D. A. Casteel, Ann Holmes

Trapping on the Robert Allerton Park study areas has been unusually good this year. Populations appear to be up on both areas. To date 120 rabbits have been trapped on the 4-H area (the previous high was 113), and 62 have been trapped on the Sanctuary area (the previous high was 55). Trapping on these areas will terminate shortly. Although the Sanctuary area is not nearly as good as the 4-H area, both areas are near optimum rabbit habitat, a compromise between a purely wild situation and intensive cultivation.

Trapping on the McDonough County areas indicates considerably lower populations. This was expected since the areas were selected because one is more wooded than the Sanctuary area, and the other is more disturbed by human activity than the 4-H area. Trapping on these areas will continue to the beginning of the hunting season.

Radio tracking was carried out on a relatively intensive scale. Eleven rabbits with radios attached were released and tracked for periods up to 2 weeks. The data have not been analyzed, but it is probably safe to say that the home range of a rabbit is smaller than expected. The greatest travelling observed was the approximately 500 yards traveled by one rabbit in one night. In most cases, rabbits remained in an area less than $\frac{1}{4}$ -acre in size all night.

5. Investigations of Furbearers

Ralph J. Ellis

Live trapping and marking operations on the Allerton Park study area were completed October 31. The results are presented in table 4.

A total of 170 captures involving 91 opossums was made during the period of April through October, 1961. Although one female was captured ten times, 31 other opossums were captured only once. The average trapping success was 1.87 captures

per opossum. The over-all age ratio of the captures was 3.1 juveniles per adult or approximately 6 young for each adult female.

Table 4. --Raccoons and opossums captured in box traps on the Allerton Park study area from April 7, 1961, through October 31, 1961.

Month	Trap Nights	Raccoon Captures			Opossum Captures		
		Adults	Juveniles	All	Adults	Juveniles	All
April	682	2(341)*	0	2(341)	3(227)	0	3(227)
May	694	4(174)	0	4(174)	7(99)	0	7(99)
June	698	7(100)	0	7(100)	5(140)	5(140)	10(70)
July	999	7(143)	9(111)	16(62)	11(91)	25(40)	36(28)
August	825	0	6(138)	6(138)	10(82)	25(33)	35(24)
September	646	0	1(646)	1(646)	5(129)	26(25)	31(21)
October	835	0	1(835)	1(835)	5(167)	43(19)**	48(17)**
Total	5,379	20(269)	17(316)	37(145)	46(117)	124(44)**	170(37)**

* Numbers in parentheses are trap nights per capture.

** Includes one opossum capture by hand.

Thirty-seven captures involving 25 different raccoons were made during the period April through October, 1961. Seventy-eight per cent of the captures were made from June through August when the young raccoons were emerging from their dens. Possibly some of the decreased trapping success during late August can be correlated with the maturation of corn in outlying fields.

Recaptures of raccoons were infrequent in comparison with opossum recaptures. Only seven raccoons were trapped more than once, and the maximum number of recaptures for any one individual was three. The age ratio of the raccoons handled after July 1 when young-of-the-year animals began appearing in the catches was 2.4 young per adult or approximately 4.8 young per adult female. These figures suggest a thriving population.

6. Waterfowl Inventory

F. C. Bellrose

In October, five aerial survey flights were taken to inventory the waterfowl population in the Illinois and Mississippi River valleys. The dates of the periodic flights were October 3, 9, 24-25, and 31. The flight on October 24 ended at Meredosia because of fog and mist. On October 19, a special flight was made in an effort to intercept a migratory movement of ducks reported by observers in Minnesota.

Duck populations in the census area increased from 63,500 to 750,000 during the month. This increase resulted from migratory movements on October 8, 14-15, 19-20, 23-24, and 30-31. Each influx of ducks was larger than the one before. Many pintails, widgeon, and green-winged teal departed the night of October 30 with the advent of a large influx of mallards and scaup.

7. Wildlife-Insecticide Relationships

R. W. Lutz

The Plant Pest Control Branch of the U. S. Department of Agriculture and the Division of Plant Industry of the Illinois Department of Agriculture are planning to treat approximately 12,000 acres south of Sheldon with 2 lbs. per acre of aldrin during early November. Questionnaires designed to provide information on mortality were distributed to the 56 farmsteads on this area.

Fifty-six farmyards on each of the Donovan and Iroquois areas, treated with 2 lbs. per acre of aldrin during the spring of 1960 and 1961, were checked for mole activity during October. An equal number of farmyards were checked on the untreated Beaverville and South Sheldon areas. The data (Table 5) suggest mole populations were reduced on treated areas.

Table 5. --Mole occurrence on 112 treated and 112 untreated farmyards during October, 1961.

	Treated		Untreated	
	Iroquois	Donovan	Beaverville	South Sheldon
Mole Occurrence (Per Cent)	42.9	30.0	89.3	73.7

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott and Wendy Patton, Editors

Urbana, Illinois

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Vol. 4, No. 11

1. Pheasant Populations and Land Use

R. F. Labisky, S. H. Mann

During the past 5 years, the sex and age structure of the prehunt populations of pheasants on the intensively farmed 23,200-acre Sibley area has shown reasonably stationary levels of productivity despite annual gains or losses in absolute numbers of pheasants on the area, table 1. Pheasants on the Sibley area nearly doubled in numbers between 1957 and 1961, yet the productivity of the annual populations, as indicated by the number of birds captured during prehunt night-lighting operations each year, did not increase proportionately to account for the increase in the number of birds. These data tentatively suggest that the gain in population abundance was due to an increased survival of hens rather than increased reproductive productivity.

Table 1. --Relationship of pheasant abundance to the sex and age structure of the prehunt populations of pheasants, Sibley area, 1957-61.

	1957	1958	1959	1960	1961
Prebreeding Population:					
Hens Per Square Mile	49.6*	not calculated		69.2*	(95.1)**
Hatched Nests Per Square Mile ***	26.8	50.5	35.8	54.4	70.4
Prehunt Sex and Age Structure					
Percentage of Cocks †	41.5(212)	40.7(354)	44.3(183)	45.3(181)	39.3(369)
Percentage of Juveniles †	71.2(212)	78.2(354)	71.0(183)	72.4(181)	74.8(369)
Juveniles of Both Sexes Per Adult Hen ‡	3.2(47)	4.4(63)	3.2(41)	3.1(43)	3.3(83)

* From aerial censuses

** Tentative calculation

*** Expansion of nesting data collected from 4.3 per cent random sample (1,000 acres)

† Sample sizes (number of pheasants) in parentheses

‡ Sample sizes (number of adult hens) in parentheses

MONTHLY WILDLIFE RESEARCH LETTER

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** Tentative calculation

*** Expansion of nesting data collected from 4.3 per cent random sample (1,000 acres)

† Sample sizes (number of pheasants) in parentheses

‡ Sample sizes (number of adult hens) in parentheses

2. Manipulation of Pheasant Habitat

Project inactive in November.

3. Extension of Pheasant Range

J. A. Ellis, W. L. Anderson, J. A. Harper

A preliminary analysis of data collected by interviewing hunters on the Neoga study area revealed that at least 34 cocks were bagged during the first 10 days of the hunting season. An additional 7 cocks (20.6 per cent of the number bagged) were crippled and were not recovered. Two hundred sixteen hunters in 73 parties expended 435 gun-hours to bag 28 of the cocks, or 15.6 gun-hours per cock. During the 20-day pheasant season in 1960, 111 cocks were known to have been shot with 6.1 man-hours spent to bag each cock. The lower kill and poorer hunting success in 1961 was caused primarily by the late harvest of corn on the area. On opening day of the current hunting season, November 18, only 35 per cent of the corn on the area had been harvested; 70 per cent of the corn had been harvested when the 1960 season opened on November 11.

The age ratio among 30 of the cocks shot by hunters in 1961 was 4.0 juveniles per adult, which disagreed considerably with the age ratio of 29.5 juveniles per adult among 61 cocks captured by night-lighting prior to the hunting season. The combined age ratio among both captured and bagged cocks is 11.0 juveniles per adult. These discrepancies in age ratios illustrate the inaccuracies that may result from small sample sizes. However, these fall age ratios among the cocks tentatively indicate that productivity was good on the area in 1961.

4. Rabbit Management

R. D. Lord, D. A. Casteel

Census drives were performed November 11 on the 4-H and Sanctuary areas of Robert Allerton Park. Analysis of the data for the 4-H study area showed the largest population of rabbits on the area in the past 6 years. This large population was probably due to the curtailment of hunting on the area last year, which resulted in the largest winter carry-over ever experienced on the area (161 rabbits on 100 acres). However, a large winter carry-over is no assurance of a large fall population since the crucial breeding season comes at a time when a reduced reproductive rate or an increased juvenile mortality rate may effectively reduce the size of the fall population. This year apparently neither of these forces were adverse enough to prevent the logical outcome of a large winter carry-over -- a large fall population. In contrast, the analysis of the census data for the Sanctuary area showed a rather ordinary population in the fall (141 rabbits on 100 acres), despite that fact that last year was the first time in many years that hunting was permitted on the area. It appears that although hunting will not have an adverse effect on a population of rabbits, a year's respite from hunting may produce a superior crop the following year. However, the evidence should not be considered conclusive since it is based on only one experiment.

5. Investigations of Furbearers

Ralph J. Ellis

During past fur seasons raccoon bacula were collected from fur buyers throughout the state. The length, weight, and sex of raccoons examined each week at the Perardi Brothers Fur Company in the northern hunting zone were recorded. Organ samples were also taken. Essentially the same procedures are being followed during the current fur season. In addition, a sample of raccoons is being examined each week at the Ed Bauer & Son Fur Company in the southern hunting zone. This is being done in a manner which will permit comparisons of the sex ratios, age structures, reproductive rates, body weights and stress indicators of raccoons examined at the two fur companies.

The samples collected during the present fur season have not been fully analyzed, but a comparison of weights has been made. The data are presented in table 2.

Table 2. --Weight comparisons of 285 raccoons from the northern and southern hunting zones examined between November 15 and November 30, 1961.

	Juveniles		Adults	
	Females	Males	Females	Males
Northern Zone (Perardi Brothers Fur Company)	11.6(58)*	11.8(43)	15.0(15)	15.2(22)
Southern Zone (Ed Bauer & Son Fur Company)	7.1(55)	7.3(55)	15.5(18)	16.3(19)

* First number indicates average weight in pounds. Number in parentheses indicates a sample size.

According to the information in table 2, the sex and age ratios in the two zones are nearly equal. The average weights of adults from the two zones appear similar. However, juveniles from the southern zone apparently weigh only three-fifths as much as those from the northern zone. The significance of this difference in weights of juveniles in the two zones is not yet apparent.

6. Waterfowl Inventory

F. C. Bellrose

In November, four waterfowl censuses were made in the Illinois River valley and three in the Mississippi River valley. Mallard populations have remained at an all-time low throughout November, the month almost all ducks migrate. At the

peak of the migration, November 6-15, there were only 560,000 mallards in the two river valleys. Mallard numbers were especially low in the Illinois River valley south of Havana and in the Mississippi River valley south of Keokuk.

The decline in mallard populations in this region of Illinois began in 1956, when peak numbers dropped to 1,485,000 from the 1955 high of 2,435,000. In 1957 the populations increased to 1,706,000 and then decreased in 1958 to 1,166,000. The decrease continued in 1959 to 850,000. A slight increase occurred in 1960 with populations of 1,064,000, but in 1961 the populations resumed their downward trend descending to the low of 560,000.

7. Wildlife-Insecticide Relationships

R. W. Lutz

The South Sheldon area (9,838 acres) and the East Iroquois area (7,450 acres) were treated with 2 lbs. per acre of aldrin during the periods from October 27-November 6, and November 6-13, respectively. Questionnaires designed to provide information on mortality were distributed to the 33 farmsteads on the East Iroquois area.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott and Wendy Patton, Editors

Urbana, Illinois

December, 1961

Vol. 4, No. 12

1. Pheasant Populations and Land Use

R. F. Labisky, S. H. Mann

A summary of data collected on the Sibley study area during the 1956 through the 1961 hunting seasons is presented in table 1. The information was obtained by interviewing hunters throughout the 20-day open season (November 11-30) in all years except 1961 when the open season was increased 5 days, November 18 through December 12. The daily bag limit was two cocks in 1956, 1957, and 1958, but in 1959, 1960, and 1961, a kill of three per day was permitted.

Table 1.--Pheasant harvest data collected during the 1956 through the 1961 hunting seasons, Sibley area.

Year	Number of Hunters Interviewed	Number of Cocks Aged by Bursal Examination	Age Ratio of Bagged Cocks Young Per Adult	Gun-Hours Per Bagged Cock	Percentage of Cocks Crippled	Percentage of Cock Population Harvested
1956	525	251	12.5	2.3	34.0	59.4
1957	443	290	4.7	3.5	24.4	12.4
1958	595	445	6.4	2.5	23.0	44.0
1959	461	454	5.6	2.9	17.8	52.5
1960	496	441	8.3	3.1	31.9	52.0
1961	443	402	7.0	2.8	20.9	----

Data from nesting studies, standardized brood counts, and pre hunt sex and age ratios obtained by night-lighting indicated that the 1961 fall population was about 25 per cent greater than in 1960. The age ratio of cocks killed in 1961 (7.0 juveniles per adult) indicates that the gain in population abundance was due to an increased survival of hens rather than increased productivity. Night-lighting data during the past 5 years support this conclusion (see Monthly Wildlife Research Letter for November, 1961).

Hunting pressure in 1961, except for the opening 2 days, was very light when compared with the previous 5 years. Inclement weather during the early part of November kept many farmers from harvesting their corn. Standing corn provided excellent cover for pheasants, but for the most part, farmers were reluctant to permit hunters in these fields. Another factor that undoubtedly kept hunters at home was the amount of time required to bag a cock after the opening 2 days. The figure showing the number of gun-hours per bagged cock (2.8 hours per cock) is

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deceiving because it primarily reflects the first 2 days of the season. It took hunters 1.9 hours to bag a bird during the opening 2 days but 5.1 hours to bag a bird during the remaining 23 days of the season. It appears that hunters became discouraged with the amount of time needed to kill a cock and thus stayed at home.

2. Manipulation of Pheasant Habitat

Project inactive in December.

3. Extension of Pheasant Range

J. A. Ellis, W. L. Anderson, J. A. Harper

Hunters killed 60 cock pheasants on the Neoga area during the 1961 pheasant season. This kill was 46 per cent less than the 111 cocks harvested on the area during the 1960 season. Hunting pressure on the area during both seasons was approximately the same.

The decline in kill from 1960 to 1961 does not necessarily indicate a decline in the population level. Prior to the 1961 pheasant hunting season, 61 cocks were captured on the area and marked with back tags. During the hunting season, 13 of these tagged cocks were harvested. The prehunt cock population was estimated by means of the Lincoln Index to be 282, or 15 per cent less than the 1960 prehunt cock population. It is believed that the large amount of standing corn in 1961, 60-70 per cent of the total corn acreage on the area compared with 20-30 per cent during the 1960 season, provided cover for the birds and made them inaccessible to hunters.

4. Rabbit Management

R. D. Lord, D. A. Casteel, Ann Holmes

Analysis of data concerning the effect of weather on cottontail activity--overall, general activity--has shown some surprising correlations. The passage of weather fronts, particularly cold fronts, caused a statistically significant increase in the activity of rabbits. There was a positive correlation between activity and wind speed in the winter and spring when the windier it was, the more active the rabbits became. There was no such correlation during the summer or fall. In the winter, spring, and fall there was a positive correlation between temperature and rabbit activity. The warmer it was, the more active the rabbits became, except in the summer when there was no relationship between temperature and rabbit activity.

A negative correlation between barometric pressure changes and rabbit activity was noted in the winter and spring. When the barometer was falling, rabbit activity increased and when the barometer was rising rabbit activity decreased. No relationship between barometric pressure and rabbit activity was evident in the summer and fall. Another analysis of the relationship between barometric pressure and rabbit activity was based on the pressure in inches of mercury rather than the rise and fall of the barometer. This analysis showed a negative correlation only in the winter when the low pressure was related to high rabbit activity and the high pressure to low activity. There was no correlation for other seasons. No relation between sky cover and rabbit activity was noted. Likewise, there was no relation between rabbit activity and the phase of the moon.

5. Investigations of Furbearers

Ralph J. Ellis

A mink study is expected to begin in 1962. Such a study would be facilitated by background knowledge of mink weights, sex ratios, age ratios and certain physical characteristics of the populations concerned. Recently an opportunity to obtain such information occurred.

Incidental to the raccoon studies, 140 skinned mink carcasses were collected during December at the Ed Bauer & Son Fur Company in the southern hunting zone and the Perardi Brothers Fur Company in the northern hunting zone. The carcasses were later weighed and measured. The heart, liver, lungs, one eye, two adrenals and two kidneys were removed for examination and weighing. Two ovaries were removed from each female and one testis plus baculum were taken from each male. Each uterus was examined for placental scars.

Some of the minks pelted each year in Illinois have light gray underfur and dark brown guard hair. These animals are called "cotton" minks in contrast to most other minks whose underfur and guard hair are both dark brown. Non-cotton minks are three to four times more valuable than cotton minks.

Eighty-five of the mink carcasses examined came from animals whose fur was identified as cotton or non-cotton, table 2. These data suggest that the cotton condition is more characteristic of females than of males. Females made up 30.5 per cent of the 85 mink whose fur condition was known. Yet, females comprise 57.0 per cent of the cotton minks.

Data in table 2 show that males accounted for approximately two-thirds of the harvest. There were no significant differences between the sex ratios of the carcasses examined prior to and after December 15. The student's t-test, 95 per cent confidence level, was used to test for differences.

Table 2.--Sex and "cotton" fur classes of 140 minks collected at the Ed Bauer & Son Fur Company, Smithboro and the Perardi Brothers Fur Company, Farmington during December, 1961.

	Non-cotton		Cotton		All Minks	
	♂	♀	♂	♀	♂	♀
Bauer Fur Company (Northern hunting zone)	13	5	2	3	50*	28*
Perardi Fur Company (Southern hunting zone)	40	13	4	5	44	18
Both Fur Companies	53	18	6	8	94	46

* Includes some minks whose fur condition was unknown.

6. Waterfowl Inventory

F. C. Bellrose

Only two waterfowl censuses were made in December as the fall migration was nearing its end. Aerial surveys of the Illinois and Mississippi River valleys were made on December 5 and 14.

A few tardy autumn migrants, green-winged teals, widgeons, gadwalls, and ruddy ducks were still present in fair numbers on December 5. However, by December 14 only those species that normally winter in Illinois were found.

As late as December 13 it appeared that a small flight of mallards had arrived along with common goldeneyes, American mergansers, and bald eagles. At that time there were 413,000 mallards; 11,800 black ducks; 1,000 pintails; 5,400 goldeneyes; 10,800 American mergansers; and 120 bald eagles in this region of the state.

Of particular interest was the low number of goldeneyes on the Illinois River, 500, as compared with the number on the Mississippi River, 4,900. Five years ago the numbers of goldeneyes on the two rivers were quite similar. The difference in populations seems attributable to the decline of mollusca in the Illinois River. Detergent pollution has affected the mollusca in the Illinois River to a much greater extent than that in the Mississippi River.

7. Wildlife-Insecticide Relationships

R. W. Lutz

The wildlife questionnaires distributed to farmers prior to the fall application of aldrin on the South Sheldon and East Iroquois areas were returned during December. The known wildlife mortality on these areas, table 3, is based on 54 questionnaires (96.4 per cent return) from the South Sheldon area and 29 questionnaires (85.3 per cent return) from the East Iroquois area.

These data represent a minimum estimate of mortality. The reports of mortality were substantially greater on those farms where harvesting operations were still in progress, because farmers who had harvested their crops prior to the application of the insecticide spent little time looking for dead animals.

Most mortality occurred during the first 2 weeks following treatment. Many songbird species had migrated prior to the application of the insecticide and were spared the heavy losses they suffered during spring applications.

Table 3.--Wildlife mortality on the South Sheldon and East Iroquois areas following application of 2 lbs. of aldrin during the fall, 1961.

Species	South Sheldon	East Iroquois	Totals
	Number Dead	Number Dead	
<u>Birds</u>			
Ring-necked pheasant	73	11	84
House sparrow	92	26	118
Starling	21	8	29
Chickens	5	4	9
Flicker	3	0	3
Pigeon	2	1	3
Meadowlark	1	0	1
Quail	0	1	1
Owl, unidentified	<u>1</u>	<u>0</u>	<u>1</u>
Sub-totals	198	51	249
<u>Mammals</u>			
Cottontail rabbit	119	22	141
Cats	97	24	121
Mice, unidentified	110	45	155
Shrews, unidentified	20	0	20
Muskrats	6	0	6
Red fox	4	3	7
Sheep	4	0	4
House rat	2	0	2
Possum	1	0	1
Fox squirrel	1	0	1
Pig	0	2	2
Mink	<u>0</u>	<u>1</u>	<u>1</u>
Sub-totals	364	97	461
Totals	562	148	710

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott and Wendy Patton, Editors

Urbana, Illinois

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Vol. 5, No. 1

1. Pheasant Populations and Land Use

R. F. Labisky, John Warnock

Hunters probably harvested a greater proportion of the available cock pheasants on the Sibley area this fall (1961) than in any of the preceding 5 years. A preliminary analysis indicated that 65.1 per cent of the cocks on the Sibley area were removed by hunters during the hunting season, November 18 to December 12, 1961. This estimate was based on the change between the prehunt sex ratio of 39.3 per cent cocks, obtained from the night-light trapping of 369 pheasants during October, 1961, and the post-hunting sex ratio of 13.7 per cent cocks, obtained from roadside counts of 4,496 pheasants during January, 1962. The harvest of cocks on the Sibley area during previous hunting seasons was 59.4, 12.4, 44.0, 52.5 and 52.0 per cent in the 5 years, 1956 through 1960, respectively.

On January 1, 1962, John E. Warnock joined the staff to assume responsibilities as project leader. Mr. Warnock received his Bachelor of Science degree in zoology from the University of Illinois in 1954, and his Master of Science degree in zoology from the University of Wisconsin in 1958. During the past 5 years, he has been engaged in an ecological and physiological study of the effects of crowding on the survival of field mice. This research will provide thesis material for his doctorate degree which he will receive from the University of Wisconsin in the near future.

2. Manipulation of Pheasant Habitat

Project inactive in January.

3. Extension of Pheasant Range

J. A. Ellis, W. L. Anderson, J. A. Harper

During the latter part of December, 1961, 288 pheasants (40 cocks and 148 hens) were trapped by night-lighting in southwestern Kansas. The pheasants were transported to the Neoga area and released. As of January 31, 1962, 13 "Kansas" pheasants (1 cock and 12 hens) had been found dead on the Neoga area. These known mortalities constitute 4.2 per cent of the total pheasants released.

A total of 217 pheasants were observed on the Neoga area in January. Fifteen of these pheasants had been marked during the prehunt period in 1961. The observed ratio between the prehunt marked birds and unmarked "native" pheasants indicated that the prehunt population was 550 birds (235 cocks and 315 hens). Another estimate of the prehunt population was based on the percentage of cocks marked

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prior to the 1961 hunting season that were harvested by hunters and the sex ratio among pheasants observed prior to the hunting season. This estimate indicated a prehunt pheasant population of 744 pheasants (285 cocks and 459 hens). The known mortality among 136 "native" pheasants marked prior to the 1961 hunting season was 25 birds or 18.4 per cent of those marked. However, 48 per cent of these losses were cocks harvested by hunters.

4. Rabbit Management

R. D. Lord, D. A. Casteel, Ann Holmes

Analysis of the 1961 bag-check data from the Robert Allerton Park 4-H study area showed that hunters killed more rabbits, spent more hours hunting, and took fewer hours to bag a rabbit than in the 3 years prior to 1961. The hunting statistics are shown in table 1.

Table 1.--Hunting statistics from the 4-H study area for the years 1956-1961.

Season	Fall Popula- tion	Spring Popula- tion	Rabbits Bagged	Per Cent of Fall Crop	Gun- Hours	Hours Per Rabbit
1956-57	333	47	113	33.9	154	1.36
1957-58	259	31	92	35.5	269	2.92
1958-59	324	132	109	33.6	365	3.35
1959-60	239	56	95	39.7	323	3.40
1960-61	309	162	Experimental curtailment of hunting this year			
1961-62	363	not yet censused	167	46.0	417	2.50

The increased returns in 1961 are almost certainly a result of curtailment of hunting in 1960. These results point to a possible technique for producing superior upland game hunting on controlled shooting areas. Curtailment of hunting for 1 year appears to produce a bumper crop the following year. Thus, a large controlled shooting area might be divided in half, with hunting allowed on each half in alternate years. This technique would be questionable for more mobile species such as pheasants, unless the shooting area was extremely large.

5. Investigations of Furbearers

Ralph J. Ellis

During the 1960-61 trapping season, a total of 279 mink carcasses were collected from the Bauer Fur Company in the southern hunting zone and the Perardi Brothers Fur Company in the northern hunting zone. All carcasses collected prior to January 10 have been examined for indices of physiological condition and reproductive status. The data on reproductive status are presented in table 2.

In addition, the document outlines the procedures for handling financial data. It states that all transactions must be properly documented and supported by valid receipts or invoices. The text also mentions the importance of keeping records for a sufficient period of time to allow for future audits and reviews.

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Table 2.--Reproductive condition of 279 minks examined at the Bauer Fur Company, southern hunting zone, and the Perardi Brothers Fur Company, northern hunting zone, during the 1961-62 trapping season.

Period	Per Cent Males With Sperm		Per Cent Females With Stimulated Uteri	
	Southern Zone	Northern Zone	Southern Zone	Northern Zone
Dec. 11-20	5.9(34)*	0.0(20)	9.5(21)	0.0(8)
Dec. 21-31	0.0(6)	0.0(15)	33.3(6)	0.0(10)
Jan. 1-10	24.6(69)	0.0(21)	24.2(33)	10.0(10)
Dec. 11-Jan. 10	17.4(109)	0.0(59)	20.0(60)	3.6(28)

* Numbers in parentheses indicate sample size.

On the basis of the presence of sperm or uterine stimulation, table 2, it appears that minks in the southern zone breed earlier than those to the north. Only 1.2 per cent of the minks from the northern zone showed signs of becoming sexually active during the trapping season, although 18.4 per cent of the minks from the southern zone were so characterized.

6. Waterfowl Inventory

F. C. Bellrose

Aerial surveys of waterfowl in the Illinois and Mississippi River valleys and other areas in central Illinois were made during January in connection with the annual nation-wide inventory of North American waterfowl.

Duck populations in Illinois were reported at the lowest point in the two decade history for inventorying waterfowl in winter. This low wintering population was a result of reduced duck populations in the Mississippi Flyway and severe weather conditions. The unusually low temperatures and snow caused mallards, black ducks, and divers to depart in large numbers on two occasions in December.

Waterfowl populations found the second week in January were: mallards, 60,500; black ducks, 2,800; pintails, 160; canvasbacks, 1,000; lesser scaups, 3,500; ring-necked ducks, 110; goldeneyes, 10,000; mergansers, 19,900; and Canada geese, 158,700.

7. Wildlife-Insecticide Relationships

R. W. Lutz

During January, 1962, 392 pheasants (190 males and 202 females) were observed on the Donovan area indicating a ratio of 94 males per 100 females. Twelve quail coveys ranging in size from 12 to 30 birds were located on the Donovan area.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott and Wendy Patton, Editors

Urbana, Illinois

February, 1962

Vol. 5, No. 2

1. Pheasant Populations and Land Use

J. E. Warnock

A final estimate of the harvest of cock pheasants from the Sibley area during the 25-day hunting season in 1961 indicated that hunters removed 77.1 per cent of the available cocks. This estimate was based on the change between prehunt and post-hunt sex ratios; the post-hunt sex ratio was corrected for a 10.8 per cent illegal kill of hens.

The prehunt sex ratio of 39.3 per cent cocks was obtained from 369 pheasants captured by nightlighting during October, 1961. The post-hunt sex ratio of 14.1 per cent cocks was calculated from roadside observations of 8,283 pheasants during January and February, 1962. The illegal kill of hens (10.8 per cent) was obtained by the fluoroscopy of 261 pheasants captured by nightlighting during January and February, 1962. Ten of 36 cocks (27.7 per cent) and 9 of 225 hens (4.0 per cent) contained lead shot.

2. Manipulation of Pheasant Habitat

D. E. Newman

Duane E. Newman joined the Natural History Survey staff on February 16, 1962 to assume responsibilities as leader of this research project. Mr. Newman received his Bachelor of Science degree in Biology from Northwest Missouri State College in 1956, and his Master of Science degree in Wildlife Management from Iowa State University in 1957. His research for his master's degree dealt with the effect of weather on roadside censuses of cottontails. Since 1958, Mr. Newman has been employed by the Wisconsin Conservation Department as a District Game Manager. He was primarily concerned with the management of forest game, principally sharp-tailed grouse, ruffed grouse, and deer, in northwestern Wisconsin.

3. Pheasant Range Extension

J. A. Ellis, W. L. Anderson, J. A. Harper

Pheasants from California stock, released with wild-trapped Illinois pheasants on the Neoga area during the winters of 1959-60 and 1960-61 contributed reproductively only to a minor extent to the pheasant population whereas the wild-transplanted hens showed reproductive efforts of considerable magnitude. Yet, "California" pheasants released on the Neoga and Bellmont areas in 1956 and 1957 did exhibit normal reproductive effort. Some light was shed on this problem when we observed that in 1961, 82.4 and 17.6 per cent of the broods on the Neoga area were produced by "native" hens (birds hatched on the area) and wild-transplanted hens, respectively, even though the population of breeding hens consisted of 54.5 per cent "native" hens, 28.6 per cent wild-transplanted hens, and 23.5 per cent "California" hens.

These data indicate a sharp differential in reproductive effort among the hens of these three strains of pheasants.

Observations in 1960 indicated that wild-transplanted pheasants dominated "California" pheasants in all social encounters. We have speculated that the negligible reproductive effort (as well as greater mortality) among the "California" pheasants may have been caused by the subordinate social position these birds held. In 1961, it appeared that "native" pheasants dominated the wild-transplanted pheasants that were dominant over the "California" birds. Thus, it is possible that social dominance is a factor in limiting reproductive success among different strains of pheasants released on the same area. During 1962, when the breeding population at Neoga consists of "native" pheasants, "California" pheasants, wild-trapped pheasants from southwestern Kansas, and Japanese green pheasants, we hope to learn more about the relationship of social dominance to reproductive success and survival of different strains of pheasants.

4. Rabbit Management

D. A. Castoel, Ann C. V. Holmes

The former project leader, Dr. Rexford D. Lord, Jr., resigned during the past month. His new address is: Pan American Zoonoses Center, P. O. Box 99, Azul, Province of Buenos Aires, Argentina.

During February, rabbits were live-trapped, marked, and released in preparation for the post-hunting season (spring) census on the study areas in Piatt and Hancock counties.

Hunters on the Allerton Park study areas required only 2.5 hours to bag a rabbit during the 1961-62 season. This is the best hunting success on these areas during the past four seasons. By way of contrast, hunters on the Hancock County study area took 81.3 hours to bag one rabbit and, as a result, only 15 per cent of the fall population was harvested.

Several factors probably contributed to the relatively poor hunting success on the Hancock County area. The study area is composed of dissected till plains favorable to a high population of groundhogs. No attempt was made to count groundhog burrows on the study area, but it was apparent that rabbits made extensive use of the burrows, which were inaccessible to hunters. During 40 of the 75 days open to rabbit hunting, the temperature was below 10° F. Snow covered the ground throughout the hunting season, and during December and January the snow was 12 to 18 inches deep. These weather conditions curtailed rabbit activity, particularly in December. At times no fresh rabbit tracks were seen for as long as 7 days after a snowfall or from one snowfall to the next. However, by mid-January, tracks were seen just after snowstorms and cold periods indicating that rabbit activity had resumed. These observations suggested that by mid-January severe weather conditions were not as important in limiting rabbit activity as they were earlier in the season.

5. Investigations of Furbearers

Ralph J. Ellis

During the past fur season, 1,547 raccoons were autopsied. Almost equal numbers of raccoons came from the northern and southern hunting zones. It was possible to assess sexual activity on 1,515 of these raccoons. Uterine swelling or pregnancy in the female and the presence of sperm in the male were considered signs of sexual activity.

Table 1 shows the effects of sex, age, latitude, and time of year on sexual activity in raccoons. These data show that during the hunting and trapping season a greater percentage of raccoons were sexually active in the southern zone than in the northern zone. Sexual activity was most apparent in adult raccoons and in the raccoons examined during the first half of the season. Table 1 also suggests that raccoons of both sexes and all age classes come into breeding condition earlier in the southern zone than in the northern zone. Adult males appear to become sexually active first, followed by juvenile males, adult females, and juvenile females.

Table 1.--Percentage of Illinois raccoons demonstrating signs of sexual activity during the 1961-62 trapping and hunting season.

	Males				Females			
	Juveniles		Adults		Juveniles		Adults	
	Northern Zone	Southern Zone	Northern Zone	Southern Zone	Northern Zone	Southern Zone	Northern Zone	Southern Zone
Nov.	4.4(68)*	13.8(58)	87.1(31)	100.0(13)	0.0(100)	0.0(46)	0.0(44)	4.3(23)
Dec.	19.8(81)	32.9(85)	97.0(34)	100.0(38)	2.4(82)	11.1(72)	0.0(37)	22.4(49)
Jan.	33.3(39)	38.7(93)	89.3(28)	100.0(70)	6.4(31)	23.8(63)	47.0(17)	81.2(48)
Feb.**	59.5(42)	54.2(24)	98.1(54)	100.0(25)	26.2(42)	18.8(16)	65.8(38)	83.3(24)†
All Months	24.8(230)	32.7(260)	93.9(147)	100.0(146)	5.9(255)	13.2(197)	24.3(136)	49.3(144)

* Numbers in parentheses indicate sample size.

** An unidentified portion of one sample examined in the northern zone during February was known to have come from the southern zone.

† Includes the only pregnancy identified.

6. Waterfowl Inventory

F. C. Bellrose

The spring inventory of waterfowl populations in Illinois started on February 23, 24, and 26. In spite of snow and ice on lakes and sloughs of the Illinois and Mississippi River valleys, waterfowl were well advanced in their spring migration. Canada geese were found throughout the census area and as far north as

Bureau and Rock Island. Mallards and pintails occurred in numbers as far north as Burlington, Iowa, in the Mississippi River valley. These species were found in smaller numbers in the Illinois River valley as far north as Chillicothe.

7. Wildlife-Insecticide Relationships

R. W. Lutz

Bird counts were conducted in the towns of Donovan and Beaverville during the summers of 1960 and 1961. The observer walked a predetermined route along the streets of each town and recorded the number of birds of each species that passed in front of him. In the summer of 1960, only 6.4 robins, grackles, and starlings were observed per hour in Donovan after the town had been treated with insecticide. In comparison, 112.8 birds of these species were observed per hour in the untreated town of Beaverville. Bird populations in Donovan appeared to be well on the way to recovery during 1961. The number of robins, grackles, and starlings observed per hour increased from 6.4 in 1960 to 128.4 in 1961, an increase of 1,906 per cent. In Beaverville, the number of birds of these species observed per hour increased only 79 per cent from 1960 to 1961; 112.8 per hour in 1960 as compared with 201.9 per hour in 1961. Results of the bird count are shown in Table 2.

Table 2.--Number of birds observed per hour in Donovan and Beaverville during 1960 and 1961.

	Donovan		Beaverville	
	Year of Treatment	Year After Treatment	Untreated	
	1960	1961	1960	1961
Hours of Observation	15	13	14.5	13
Number of Birds Per Hour				
Robins	4.7	43.5	33.9	44.0
Common Grackles	0.6	43.0	45.0	93.2
Starlings	1.1	41.9	33.9	64.7
House Sparrows	80.9	120.3	88.9	107.6
Mourning Doves	14.4	25.9	18.1	23.3
Miscellaneous Birds	23.9	32.9	20.1	44.9
Total for All Species	125.6	307.5	239.9	377.7

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Wendy Patton, Editors

Urbana, Illinois

March, 1962

Vol. 5, No. 3

1. Pheasant Populations and Land Use

J. E. Warnock

The harvest of the prehunt population of cocks on the Sibley area has averaged 63.4 per cent for the past 6 years, table 1. The greatest harvest occurred in 1961 when 77.1 per cent of the cocks were removed by hunters; the poorest harvest occurred in 1957 when only 27.6 per cent of the cocks were removed. The illegal kill of hen pheasants averaged 10.2 per cent of the prehunt population of hens in 1959, 1960, and 1961.

The harvest of available cocks averaged 54.8 per cent during 1956, 1957, and 1958, when a daily limit of two cocks was permitted. In 1959, 1960, and 1961, when the daily bag was increased from two to three cocks, an average of 71.9 per cent of the available cocks was harvested. It is suggested that the increase in the harvest of cocks during the past 3 years was not only the result of an increase in the daily bag of cocks but also the result of the influence of such variables as weather, habitat, and intensity of hunting.

Table 1.--Harvest of cock pheasants on the Sibley study area, 1956-61.

Year	Season and Bag	Per Cent Cocks in Population		Per Cent Illegal Kill of Hens*	Per Cent of Cocks Harvested‡
		Prehunt	Posthunt		
1956	20 days; 2 cocks	46.8	19.0	10.2**	75.8
1957	20 days; 2 cocks	41.5	36.1	10.2**	27.6
1958	20 days; 2 cocks	40.7	22.8	10.2**	61.1
1959	20 days; 3 cocks	44.3	21.1	13.2	70.3
1960	20 days; 3 cocks	45.3	21.7	6.7	68.2
1961	25 days; 3 cocks	<u>39.3</u>	<u>14.1</u>	<u>10.8</u>	<u>77.1</u>
Average		43.0	22.5	10.2**	63.4

† Prehunt and posthunt sex ratios obtained by nightlighting and roadside counts, respectively.

* Based on fluoroscopic examination of hens captured by nightlighting during post-hunting period.

‡ Based on change between pre- and posthunt sex ratios, and adjusted for illegal kill of hens.

** Average of statistics for 1959, 1960, 1961; no fluoroscopy data for 1956, 1957, 1958.

2. Manipulation of Pheasant Habitat

D. E. Newman

This project is designed to investigate the feasibility of establishing and maintaining cover on roadside areas for the purpose of creating favorable habitat areas for nesting pheasants. Since the late 1930's, pheasants have been most abundant in the intensively cultivated cash-grain belt of east-central Illinois. However, within the past 5 years, land-use practices have become greatly intensified in this area. This changing land-use has been toward significantly greater acreages of row crops (corn and soybeans) and lesser acreages of small grains and tame hay. This trend has evolved from the fact that commercial fertilizers have eliminated the need for forage crops, used as green-manure crops to maintain soil tilth and fertility, and have allowed row crops to be grown in continuous culture. Previous research has demonstrated that the majority of the annual hatch of pheasants is produced in hayfields in east-central Illinois. This research has further demonstrated the adverse influence changing land-use has exerted on the pheasant populations in the past few years, particularly in 1959, 1960, and 1961.

Roadside cover has not ranked exceptionally high with respect to the annual production of pheasants in past years; generally about 7 to 10 per cent of the annual hatch of chicks can be attributed to roadside nests. However, it is our belief that roadsides, if properly planted and managed solely for nesting, could provide favorable nesting cover to partially compensate for the declining nesting habitat in the form of small grains and tame hay.

Roadsides adjacent to both private and estate lands within the Sibley study area were examined this month to locate the most feasible sites for establishing plots of roadside cover. Contacts with county highway superintendents and township road commissioners were made to inform them of the objectives of this research and to obtain their approval for undertaking this work on the roadsides. Farmers on the Sibley area have shown enthusiastic approval and cooperation with respect to this project.

3. Extension of Pheasant Range

J. A. Ellis, J. A. Harper, W. L. Anderson

The weights of pheasants from the Neoga study area compare favorably with weights of pheasants from areas where self-maintaining pheasant populations have been established. The weights of pheasants from Neoga in 1961 were compared with weights of pheasants from established ranges in South Dakota in 1946. To make this comparison, body weights were obtained from 144 pheasants (60 cocks and 84 hens) captured on the Neoga area between September 18 and November 18, 1961 and from 27 cocks shot by hunters during the 1961 hunting season. A total of 177 weights (86 cocks and 91 hens) were obtained, including those of juvenile birds recaptured at different ages.

Juvenile pheasants from the Neoga area weighed slightly more than juveniles from South Dakota. For example, juvenile cocks and hens (14 weeks or more in age) from the Neoga area averaged $1,271 \pm 32$ and 922 ± 14 grams in weight, respectively; in South Dakota juvenile cocks and hens of similar age averaged 1,192 and 880 grams, respectively.

Adult hens released on the Neoga area prior to the 1961 breeding season averaged 972 ± 14 grams in weight, while adult hens reared on the area weighed less, averaging 913 ± 18 grams. Average weight of adult hens in South Dakota during October and November, 1946, was 965 grams. The differences between the mean weights of adult hens released on the Neoga area and adult hens reared on the area were significant at the 95 per cent level when tested by Student's t test. These differences between the mean weights of adult hens released on the area and those reared on the area suggest that (1) adult hens reared on the area may be suffering from a nutritional deficiency, (2) survival among smaller hens reared on the area may be greater than among larger hens reared on the area, or (3) the differences in body weights may be due to the small sample sizes involved.

4. Rabbit Management

Glen C. Sanderson, D. A. Casteel

The census drives, held March 11 on the Robert Allerton Park study areas, showed a population of 24 rabbits on the 4-H area compared to a pre hunting season population of 363 rabbits. The probability of dying statistics for the 4-H area for the past 6 seasons are shown in table 2.

Table 2.--Probability of dying statistics for the 4-H area, 1956-62.

Season	Fall Population	Spring Population	Probability of Dying
1956-57	333	47	.858
1957-58	259	31	.880
1958-59	324	132	.592
1959-60	239	56	.765
1960-61*	309	162	.475
1961-62	363	24	.934

* No hunting during this season.

The 1961-62 season had the highest probability of dying and the smallest winter carry over in the past 6 years. The 1961-62 figures are especially striking when compared with those of 1960-61 when hunting was not permitted on the area and the lowest probability of dying and highest carry over resulted. During the 1961-62 season, 46 per cent of the fall rabbit population was bagged by hunters. A previous study of crippling losses indicated that at least an additional 10 per cent of the fall rabbit crop is lost through crippling. Thus, a mortality rate of approximately 56 per cent can be attributed to hunting on the 4-H area in 1961-62. Other mortality factors presumably accounted for the remaining 37 per cent of the fall population which died prior to the spring census.

When the 4-H area was closed to hunting during the 1960-61 season, 47.5 per cent of the fall population died due to natural causes. Even though the total mortality rate for 1961-62 was 93 per cent of the fall population, only 37 per cent

of the fall population died due to natural causes. These figures indicate that perhaps the mortality due to hunting caused a reduction in the natural mortality from 47.5 per cent of the fall population during 1960-61 to 37 per cent during the 1961-62 season. The opening of the area to hunting did not cause an additional 56 per cent of the fall population to die, but only an additional 45.5 per cent. This is to be expected because of density dependent factors.

In contrast, rabbits on the Sanctuary area, which was closed to hunting during 1961-62, had a probability of dying of only 9 per cent. This figure is based on a pre hunting estimate of 141 rabbits and a post hunting estimate of 128 rabbits. These figures seem to reflect a high rate of survival on the Sanctuary area during the past winter. This survival rate may be associated with the relatively lower fall population and heavier cover on the Sanctuary area than on the 4-H area. During the 1960-61 season, when the Sanctuary area was hunted, the probability of dying was 43 per cent.

5. Investigations of Furbearers

Ralph J. Ellis

Eye lenses were collected from more than 1,500 raccoons during the past fur season. Approximately half of the lenses came from raccoons in the southern hunting zone; the remainder came from the northern hunting zone. These lenses were dried and weighed. The ages of the raccoons from which the lenses came were estimated on the basis of the lens weight. Knowledge of the age and the approximate date of death of each raccoon permitted an estimate of birth dates.

Table 3.--Mean and modal birth dates of 825 Illinois raccoons born in 1961 and examined during the 1961-62 fur season*.

		Northern Zone	Southern Zone
Mean Birth Date	Males	April 15 (201)**	May 1 (249)
	Females	April 27 (191)	May 13 (184)
	All Raccoons	April 23 (392)	May 6 (433)
Modal Birth Date	Males	March 9 (201)	February 23 (249)
	Females	April 8 (191)	May 5 (184)
	All Raccoons	April 8 (392)	April 18 (433)

* Birth date estimates were based on age estimate derived from lens weights.

** Numbers in parentheses indicate sample sizes.

Table 3 and figure 1 show differences between the birth dates of raccoons of different sexes and origins. Only raccoons judged to have been born during 1961 are represented. Table 3 indicates that the mean birth date of raccoons was earlier in the northern hunting zone than in the southern zone. However, figure 1 suggests that very early litters are more characteristic of raccoons in the southern zone than in the northern zone. Figure 1 also suggests that the births are spread out more over the 7 month period in the southern zone than in the northern zone. A

2. The second part of the document focuses on the implementation of the proposed changes. It details the steps involved in the process, from the initial planning stage to the final execution. This section also addresses the potential challenges that may arise during the implementation phase and provides strategies to overcome them.

3. The third part of the document discusses the expected outcomes of the proposed changes. It outlines the benefits that the organization can expect to realize, such as improved efficiency, reduced costs, and enhanced customer satisfaction. This section also provides a timeline for the implementation of the changes, allowing the organization to plan accordingly.

4. The fourth part of the document discusses the role of the various departments in the organization. It outlines the responsibilities of each department and how they will contribute to the successful implementation of the proposed changes. This section also provides a list of the key personnel involved in the process, along with their contact information.

tendency for the earlier litters to have a greater percentage of males than the later litters was noted (table 3).

February	XXXXXXXXXXXXXXXXXXXXX*	(40)**
	CCCCCCCCCCCCCCCCCCCC	(47)
March	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	(71)
	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	(65)
April	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	(87)
	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	(63)
May	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	(63)
	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	(75)
June	XXXXXXXXXXXXXXX	(37)
	CCCCCCCCCCCCCCCCCCCC	(43)
July	XXXXXXXXXX	(21)
	CCCCCCCCCCCCCCCCCCCC	(43)
August	XXXXXXX	(19)
	CCCCCCCCCCCCCCCC	(30)

* Each character represents two raccoons; X = Northern hunting zone
O = Southern hunting zone

** Total number of raccoons represented.

Figure 1.--Estimated bird dates of 704 Illinois raccoons examined during the 1961-62 fur season.

6. Waterfowl Inventory

F. C. Bellrose

Five complete coverages were made of the waterfowl census area during March. In addition, three censuses were started but were not completed because of poor visibility.

Snow and ice-covered waters slowed the northward movement of waterfowl until March 17. A tremendous surge of tardy northbound ducks occurred from March 17 to 23. During that period, 18 species of ducks, from the early migrating pintail to the late migrating blue-winged teal, moved into the northern part of the state.

A second but somewhat smaller influx of migrating ducks occurred on March 28 and 29. This "wave" of migrants consisted largely of mallards, green-winged and blue-winged teals, widgeons, shovellers, and lesser scaups.

The largest number of green-winged teals, widgeons, lesser scaups, and ring-necked ducks ever recorded (1956 to date) during the spring occurred this year. This large number of birds may have occurred as a result of the extensive food supply made available by flood waters in the Illinois and Mississippi River valleys.

7. Wildlife-Insecticide Relationships

R. W. Lutz

Roadside rabbit censuses have been conducted along a 33-mile route on the Donovan and Beaverville areas from March, 1960 to the present. Counts were started at least one hour after sunset with the exception of the period from April to August. During these months, counts were made during the early morning hours. Whenever possible at least two counts were conducted on each area each month. The Donovan area habitat was found to be more suitable for rabbits than the habitat on the Beaverville area. Results of the censuses are shown in table 4.

Table 4.--Number of rabbits observed per mile on the Donovan and Beaverville areas from March to December, 1960 and 1961.

	Donovan		Beaverville	
	Year of Treatment	Year after Treatment	Untreated	
	1960	1961	1960	1961
Miles Driven	1,614	1,244	1,584	1,243
Rabbits per Mile	.20	.45	.08	.13

During 1960, when the Donovan area was treated with aldrin, 2.5 times as many rabbits per mile were observed on the treated area as on the untreated Beaverville area. In 1961, the year after treatment, 3.5 times as many rabbits per mile were observed on the treated area as on the untreated area. The number of rabbits observed per mile on the treated area in 1961 was 2.2 times greater than in 1960; on the untreated area in 1961, the number of rabbits observed per mile was 1.6 times greater than in 1960. These data suggest that rabbit populations, as a whole, were unaffected by the application of aldrin.

THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY
JANUARY 1961

TO THE HONORABLE CHAIRMAN OF THE BOARD OF TRUSTEES

FROM THE DEPARTMENT OF CHEMISTRY
AND THE UNIVERSITY OF CHICAGO
FOR THE YEAR 1960-1961

THE UNIVERSITY OF CHICAGO
DEPARTMENT OF CHEMISTRY
JANUARY 1961

THE UNIVERSITY OF CHICAGO

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott and Wendy Patton, Editors

Urbana, Illinois

April, 1962

Vol. 5, No. 4

1. Pheasant Populations and Land Use

J. E. Warnock

An improved transistor radio to facilitate studies of behavior and movement has been designed for attachment on wild pheasants. The radio was recently attached (by a backtag harness) to a pheasant confined in an enclosure, and the performance of the radio was evaluated for a few days. In order to explore the possibility of using radios in studying the nesting and renesting biology of the pheasant, two radios will be attached to wild pheasants on the Sibley area during May.

G. Blair Joselyn joined the staff as assistant project leader on April 16. Mr. Joselyn received his Bachelor of Science degree in zoology from Iowa State University in 1957 and his Master of Science degree in zoology from Southern Illinois University in 1961. His master's thesis was concerned with an evaluation of the economics of the Canada goose flock in southern Illinois. Mr. Joselyn served as conservation and wildlife management officer for the U. S. Army at Fort Riley, Kansas from July, 1960 to April 1, 1962.

2. Manipulation of Pheasant Habitat

D. E. Newman

The first phase of this project, designed to investigate the feasibility of establishing and maintaining roadside cover for nesting pheasants, began with the manipulation of roadsides along $5\frac{1}{2}$ miles of roadway on the Sibley area. Twenty, $\frac{1}{4}$ -mile plots along 5 miles of roadway and four, $\frac{1}{8}$ -mile plots along $\frac{1}{2}$ -mile of roadway were manipulated. These plots are located along black-top, gravel, and unimproved dirt roads. The manipulation process consists of plowing the roadside area, rototilling twice, and seeding to a grass-legume mixture with a nurse crop of oats.

First, the oats were sowed and then harrowed to insure proper depth of planting. Next, the grass-legume mixture was sowed and harrowed at a shallower depth than the oats. All seedings were applied with a cyclone hand seeder. The oats were applied at the rate of 32 pounds per acre; the grass-legume mixture, consisting of alfalfa, red clover, brome grass, timothy, and orchard grass, was applied at the rate of 16 pounds per acre.

Soil samples were collected systematically from 20 roadside plots. Analyses of the samples showed that soil from roadsides within the sample area has favorable pH levels, medium to high amounts of phosphorus, and very high amounts of potassium.

The project will include four, $\frac{1}{4}$ -mile treatments (totaling 1 mile) in each 1-mile block. These treatments include: (1) planting on both sides of the road, (2) and (3) planting on alternate sides of the road, and (4) control (no planting). The treatments were randomized within each 1-mile block to facilitate the use of statistics in analyses of the data.

MAY 10 1962

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3. Extension of Pheasant Range

J. A. Ellis, J. A. Harper, W. L. Anderson

Winter mortality among "native" pheasants captured on the area during fall and winter, 1961-62 and wild-trapped Kansas pheasants released on the area in late December, 1961 does not appear to be abnormal when compared with the mortality reported among self-maintaining populations of pheasants (table 1). Mortality among game-farm birds, Japanese green and California pheasants, is comparable to that of "native" and wild Kansas birds even though the game-farm birds were not released until March, 1962. In addition to the 42 marked "native" pheasants found dead on the area, the remains of 35 unmarked "native" birds (5 cocks and 30 hens) also have been found. A thorough study is needed to clarify the various aspects of pheasant mortality in winter on the Neoga area and in areas with established pheasant populations.

As of April 30, 107 individual cocks have been located on the Neoga area; in 1961, 88 individual cocks were located during the entire breeding season. Thus, the 1962 population of breeding hens is presently undetermined but is probably equal to or greater than the 1961 population of 238 hens.

Table 1.--Mortality among the various strains of pheasants on the Neoga area from their date of capture or release on the area to April 23, 1962. Numbers in parentheses are percentages.

Kind or Origin of Pheasants	Time of Capture or Release	Number of Pheasants Marked		Number of Marked Pheasants Recovered	
		Cocks	Hens	Cocks	Hens
Native	Fall and Winter, 1961-62	68	89	24 (35.3)	18 (20.2)
Kansas	December, 1961	40	248	6 (15.0)	70 (28.2)
Japanese green	March, 1962	32	118	11 (34.3)	35 (29.7)
California	March, 1962	none	150	none	30 (20.0)
Total		140	605	41 (29.3)	153 (25.3)

4. Rabbit Management

G. C. Sanderson, D. A. Casteel

Lenses from approximately 1,400 rabbits bagged by hunters during the past hunting season were dried and weighed during April. These lenses were collected by conservation officers, biologists, and others interested in this project. Analysis of the data is not yet complete.

The remaining live traps on both the Allerton Park and Hancock County study areas were picked up during April. Poor weather conditions prevented an earlier collection of these traps. Final "rabbit proofing" of the rabbit enclosure constructed at Macomb by Western Illinois University was completed this month. The enclosure will be used for observing the mating behavior of cottontails.

5. Investigations of Furbearers

Ralph J. Ellis

An analysis of the 1961-62 fur harvest in Illinois was made by examining written reports from trappers, hunters, and fur buyers. Prices received for Illinois furs during the 1961-62 season apparently changed very little from those received during the 1960-61 season, table 2.

Table 2.--Average prices received by hunters and trappers for Illinois furs as revealed by voluntary reports from fur buyers.

Species	Average Price Received Per Pelt				
	1957-58	1958-59	1959-60	1960-61	1961-62
Mink	\$10.23	\$11.05	\$12.18	\$9.44	\$8.54
Beaver*	4.69	4.59	4.64	7.86	4.78
Raccoon	.91	.77	1.38	1.41	1.62
Skunk	.79	.80	.82	.69	.70
Muskrat	.71	.68	.85	.70	.67
Weasel	.43	.57	.63	.55	.49
Red Fox	.21	.33	.79	.96	1.09
Gray Fox	.11	.20	.48	.65	.58
Opossum	.13	.15	.34	.53	.41

* The first four beaver prices are for the 1957, 1958, 1959, and 1960 spring seasons. During 1961 beaver were trapped both in the spring and during the regular trapping season. Therefore, the price of beaver listed under the 1961-62 column reflects both buying periods.

Table 3.--Average monetary returns per trapper for his total catch of each species during fur seasons from 1957-58 to 1961-62 as revealed by reports from trappers and fur buyers.

Species	Season				
	1957-58	1958-59	1959-60	1960-61	1961-62
Muskrat	\$32.99	\$32.59	\$61.59	\$39.83	\$48.56
Mink	24.31	25.86	38.31	15.67	22.31
Raccoon	3.70	1.84	7.90	6.33	5.96
Beaver	no catch	.70	.09	----*	3.74*
Opossum	.05	.05	.81	.48	.42
Fox	.03	.15	.54	.22	.22
Skunk	.08	.03	.14	.08	.13
Weasel	.02	.03	.02	.02	.03
All Species	\$61.18	\$61.25	\$109.40	\$62.63	\$81.37

* Both trappers and fur buyers reported beaver caught during the spring season of 1961 with the catch for the winter of 1961-62.

Table 3 shows that the average monetary return per trapper for his total catch during the 1961-62 season was considerably higher than during most recent seasons.

Analysis of the trappers' reports also suggested that the number of each species of fur bearers harvested was greater during the 1961-62 season than during the 1960-61 season. However, the 1960-61 fur harvest appeared to be lower than most recent harvests.

6. Waterfowl Inventory

F. C. Bellrose

Three aerial surveys of waterfowl populations in the Illinois, Mississippi, and Rock River valleys were made during April. The waterfowl populations continued to be above normal throughout this period.

In April, 1962 the populations of some species of waterfowl in both the Illinois and Mississippi River valleys were greater than any recorded during spring censuses from 1956-61. Species present in unusually large numbers were: green-winged and blue-winged teals, widgeons, gadwalls, shovellers, lesser scaups, and ring-necked ducks.

Unusually large waterfowl concentrations occurred in flooded agricultural fields in the Illinois River valley below Peoria, in the Mississippi River valley below Keokuk, and in the Rock River valley below Prophetstown. With the exception of lesser scaups, duck populations were very low in the Mississippi River valley between Keokuk and Rock Island. Ducks appeared to be leaving the Mississippi River below Keokuk to fly northwestward into Iowa. Much more farmland was inundated by the Des Moines, Skunk, Iowa, and Cedar Rivers during the spring of 1962 than in past years. Apparently, ducks were taking advantage of the bountiful supply of food made available by the flood waters.

7. Wildlife-Insecticide Relationships

R. W. Lutz

An effort was made to evaluate the effect of insecticides on field bird populations in hayfields on the Donovan, Maple Grove, and Beaverville areas during 1960 and in hayfields on the Donovan, Iroquois, and Beaverville areas during 1961. The Donovan and Iroquois areas were treated with 2 pounds per acre of aldrin in the spring of 1960 and 1961, respectively. The Maple Grove area was treated with 2 pounds per acre of heptachlor in the spring of 1960. The Beaverville area was not treated in either 1960 or 1961.

In both 1960 and 1961, two hayfields on each of the areas were studied during June and July. Observations were started at sunrise and continued until all fields were visited. The observer walked through the fields and recorded all birds flushed within a 30 yard transect. The order in which the fields were visited was changed each day so that all fields received the same number of hours of observation in relation to sunrise.

Reasonably good counts were obtained for the following species: meadowlarks, dickcissels, red-winged blackbirds, bobolinks, horned larks, and grasshopper sparrows. Results of these counts are presented in table 4.

Table 4.--Comparison of the number of selected species of birds observed per hour in treated and untreated hayfields during June and July, 1960 and 1961.

	Donovan		Maple Grove	Iroquois	Beaverville	
	Year of	Year After	Year of	Year of	Untreated	
	Treatment	Treatment	Treatment	Treatment	1960	1961
	1960	1961	1960	1961		
Hours of Observation	15	12	15	12	15	12
Birds per Hour						
Prairie Horned Lark	2.2	2.8	0.7	3.7	0.1	4.7
Bobolink	11.6	3.8	14.6	3.0	3.0	0.3
Meadowlark	2.0	2.4	1.2	0.8	9.0	14.5
Red-winged Blackbird	7.1	7.3	11.6	2.3	20.0	0.9
Dickcissel	12.1	9.0	12.6	4.0	25.7	2.3
Grasshopper Sparrow	6.1	3.2	0.7	6.4	1.9	5.8
Total for All Species	41.1	29.0	41.4	20.2	59.7	28.5

The summers after treatment more birds were observed per hour in untreated fields than in treated fields. The summer of 1960, after the Donovan and Maple Grove areas were treated, 41.1 and 41.4 birds were observed per hour, respectively, in treated fields. In comparison, 59.7 birds were observed per hour in the untreated Beaverville fields. After the Iroquois area fields were treated in 1961, only 20.2 birds were observed per hour. Bird populations in the fields of the Donovan area appeared to be well on the way to recovery in 1961 when 29 birds were observed per hour in the Donovan fields compared with 28.5 birds observed per hour in the untreated fields.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott and Wendy Patton, Editors

Urbana, Illinois

May 1962

Vol. 5, No. 5

1. Pheasant Populations and Land Use

J. E. Warnock

The average number of cock calls recorded per 2-minute stop during periods of peak crowing (early May) in the past 6 years is not directly proportional to the total number of cocks in winter populations or to the percentage of cocks in post-hunting populations, table 1.

The rate of crowing may increase with increased abundance of cocks to a level where social factors regulate the average rate of crowing per cock. The relationship between cock abundance and frequency of crowing merits detailed study to establish the reliability of the cock-call count as a census technique for various population densities.

Table 1.--Abundance of cock pheasants, the posthunt sex ratio, and the maximum frequency of cock calls recorded per 2-minute stop on the Sibley study area, 1957-62.

Year	Number of Birds* in Winter Population	Number of Cocks in Winter Population	Percentage of** Cocks in Winter Population	Number of Cock Calls Per 2-minute Stop During Period of Maximum Crowing
1957	2,264	420	19.0	34.1
1958	2,879	1,039	36.1	37.3
1959	---	---	22.8	39.9
1960	3,244	684	21.1	37.1
1961	---	---	21.7	54.1
1962	---	---	14.1	38.2

* Aerial census

** Roadside observations

3. Manipulation of Pheasant Habitat

D. E. Newman

Twenty-four, 1/4-mile plots and eight, 1/8-mile plots along 7 miles of roadway (both sides) on the Sibley area were manipulated and planted to a grass-legume mixture during April and May. A comparable number of plots were left undisturbed to serve as control areas. The grass-legume plantings on the roadside areas have

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shown good growth during May as moisture and general weather conditions have favored the establishment of the new seedlings.

A search for pheasant nests on the manipulated and control roadside plots began during May. At present, the only nesting cover on the manipulated plots is provided by fencerows, field edges, and occasionally, road shoulders, because the new seedlings have not yet attained the height or density proportions believed necessary for pheasants to establish nests. The nurse crop of oats in the seeded plots will probably offer nesting cover later in the nesting period.

3. Extension of Pheasant Range

J. A. Ellis, J. A. Harper, W. L. Anderson

One hundred and twenty-one individual cocks were located on the Neoga area by audio-censuses and observations during the spring of 1962; 88 individual cocks were located by the same methods in 1961. The reasons for the 37.5 per cent increase in the number of breeding cocks between 1961 and 1962 are not readily apparent. However, 46 per cent fewer cocks were harvested during the 1961 hunting season than during the 1960 season. In addition, Kansas cocks released on the area in December, 1961 appear to have survived the winter in greater numbers than did "wild-transplanted" cocks released in the winter of 1960.

Of the 121 cocks located this spring, 55 (45.5 per cent) were identified as to their origin; native and Kansas cocks comprised 76 per cent and 24 per cent, respectively, of the identified cocks.

As of June 1, 1962 the population of hens on the Neoga area appeared to be at least equal to the population of hens reported in 1961. However, additional observations of breeding hens, nests, and broods will be necessary before the two populations can be accurately compared with respect to abundance.

4. Rabbit Management

G. C. Sanderson, D. A. Casteel

Before the 1961-62 rabbit hunting season opened, each Illinois conservation officer was furnished with a rugged metal container filled with 10 per cent formalin for preserving eyes collected from rabbits killed by hunters. More than twice as many eyes were received this season as in 1960-61. In addition, the number of counties represented increased from 26 for each of the previous 2 years to 80 in 1961-62. Analyses of the lenses indicated that the average age of rabbits has decreased in each of the regions for the past 3 years, table 2. During the past 3 seasons rabbits in the southern region have had the oldest average age and rabbits in the prairie region, the youngest average age. Data on the average age of cottontail rabbits are shown in table 2.

Table 2.--Average age of cottontail rabbits as determined from analyses of lenses collected from rabbits killed by hunters.

Region	1959-60		1960-61		1961-62	
	Average Age (Months)	Number	Average Age (Months)	Number	Average Age (Months)	Number
South	9.97	322	8.50	1,161	8.00	1,692
Prairie	8.57	198	7.05	109	6.00	487
West and Northwest	8.63	389	7.90	196	7.00	969
Total	9.09	909	8.31	1,466	7.00	3,148

5. Investigations of Furbearers

Ralph J. Ellis

During the 1961-62 fur season, raccoon bacula were collected from furbuyers throughout Illinois. Each baculum was classified as from a preyearling or post-yearling raccoon, table 3.

Table 3.--Preyearling raccoons expressed as percentages of all raccoons represented by bacula collected in Illinois during the 1961-62 fur season.

Period	Northern Hunting Zone	Southern Hunting Zone	Entire State
First Half of Season	72.9 (783)*	74.8 (1,227)	74.1 (2,010)
Second Half of Season	55.1 (227)	57.4 (674)	56.6 (901)
Entire Season	69.1 (1,257)**	68.6 (1,901)	68.8 (3,158)

* Sample sizes in parentheses

** Includes 147 bones with unknown collection dates

These data suggest that the production of male raccoons was high during the summer of 1961. To test the hypothesis that the production of females was as high as that of males, a comparison was made between 724 males and 702 females selected at random and autopsied in two fur houses during the 1961-62 fur season, table 4.

Table 4.--Preyearling* raccoons expressed as percentages of all raccoons autopsied at the Bauer Fur Company, southern hunting zone, and the Perardi Brothers Fur Company, northern hunting zone, during the 1961-62 fur season.

Period	Northern Hunting Zone		Southern Hunting Zone		Entire State	
	Males	Females	Males	Females	Males	Females
First Half of Season	73.9(157)†	74.2(221)	82.5(154)	65.9(179)	78.1(311)	70.5(400)
Second Half of Season	57.8(192)	57.8(135)	55.8(231)	52.1(167)	56.7(423)	54.6(302)
Entire Season	65.0(349)	68.0(356)	66.5(385)	59.2(346)	65.8(734)	63.7(702)

* Males were aged according to characteristics of the bacula; females were aged according to presence of placental scars and the closure of the epiphyses in the radii and ulnae.

† Numbers in parentheses indicate sample sizes.

The comparative data suggest that the production of females during the summer of 1961 was nearly equal to that of males, table 4. In the sample from the northern hunting zone the percentages of preyearlings in the male and female samples were nearly equal, table 4. However, in the southern hunting zone preyearlings comprised 66.5 per cent of the males sampled but only 59.2 per cent of the females. The reasons for this difference are unknown.

A strong tendency for preyearlings to be caught earlier than older raccoons was noted, tables 3 and 4. This tendency was expected because younger animals are usually less wary and thus more easily caught than older animals.

6. Waterfowl Inventory

F. C. Bellrose

Project inactive during May.

7. Wildlife-Insecticide Relationships

R. W. Lutz

A nest study was conducted along the osage-orange hedgerows on the Donovan, Beaverville, and Iroquois areas during 1960 and 1961 to evaluate the effects of aldrin on dove and songbird reproduction. The Donovan and Iroquois areas were treated with 2 pounds per acre of aldrin in the spring of 1960 and 1961, respectively. The Beaverville area was not treated in either 1960 or 1961.

Four miles of hedge on each of the Donovan and Beaverville areas were studied from May 3 to September 10, 1960 and from April 1 to August 30, 1961. In addition, 4 miles of hedge on the Iroquois area were studied from April 1 to August 30, 1961. All nests were inspected every 8 to 10 days. On each visit all nests that were active, or had been active, were checked and their status recorded. The number of nests located and the nesting success for each species during 1960 and 1961 is presented in table 5. The data indicates that those birds which survived the treatment nested and produced young without apparent ill effects.

Brown thrashers were virtually annihilated on the treated areas. No successful nests were located on the Donovan area in 1960. In 1961, a year after treatment, 14 nests were found, 64.2 per cent of which were successful. Two thrasher nests were located on the Iroquois area after it was treated in 1961. None of these nests were successful however, and adults and young were not observed on this area during the summer of treatment. In contrast, in 1960 and 1961, 55.6 and 43.8 per cent, respectively, of the brown thrasher nests on the untreated Beaverville area were successful.

Grackle reproduction appeared to be retarded on the Iroquois area after the area was treated in 1961, as only 5.8 per cent of the 17 nests under observation were successful. In comparison, 73.1 per cent of the 26 nests under observation on the untreated Beaverville area were successful. Grackles were common residents of the untreated area but were rarely observed on the Iroquois area in the months following treatment. The nest study will be repeated in 1962.

Table 5.--Number of nests and nesting success on the Donovan and Beaverville areas during 1960 and 1961, and on the Iroquois area in 1961.

Species	Donovan Area				Beaverville Area				Iroquois Area	
	Number of Nests		Per Cent Nesting Success*		Number of Nests		Per Cent Nesting Success*		Number of Nests	Per Cent Nesting Success*
	1960	1961	1960	1961	1960	1961	1960	1961	1961	1961
Mourning Dove	26	30	76.9	60.0	7	10	85.8	60.0	18	44.4
Yellow-billed Cuckoo	9	6	88.8	50.0	2	0	100.0	--	3	66.7
Blue Jay	0	0	--	--	1	1	100.0	100.0	0	--
Crow	0	2	--	50.0	0	4	--	50.0	0	--
Catbird	0	1	--	100.0	1	1	0.0	0.0	1	0.0
Brown Thrasher	1	14	0.0	64.2	9	16	55.6	43.8	2	0.0
Robin	0	1	--	100.0	0	1	--	0.0	0	--
Shrike	1	2	0.0	50.0	0	0	--	--	0	--
Common Grackle	0	0	--	--	0	26	--	73.1	17	5.8
Cardinal	18	32	44.4	37.5	13	16	15.4	12.5	21	23.8
Indigo Bunting	1	0	0.0	--	0	0	--	--	0	--
Goldfinch	0	2	--	50.0	0	0	--	--	2	50.0
Total	56	90	64.3	52.2	33	75	48.6	49.3	64	26.5

* Per cent of nests under observation that fledged young.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Thomas G. Scott, Editor

Urbana, Illinois

June, 1962

Vol. 5, No. 6

1. Pheasant Populations and Land Use

J. E. Warnock

The distribution in relation to field edge of 162 pheasant nests found in 88 acres of tame hay during June, 1962, on the Sibley Study Area shows that the portion of the fields located 30-60 yards from the field edge had the highest density of nests (Table 1). A distance of 0-90 yards from the field edge made up 75.8 per cent of the area searched and contained 87.7 per cent of the nests. A distance of 90-220 yards from the field edge constituted 24.1 per cent of the area searched but contained only 12.2 per cent of the nests.

The relationship of pheasant nesting to field edge in hayfields of different sizes and shapes will be investigated further to determine the absence of presence of an "edge effect." Thus, potential management techniques can be evaluated.

Table 1. --Location of pheasant nests in relation to field edge in hayfields, Sibley Study Area, 1962.

Distance from Field Edge (in yards)	Number of Square Yards Searched	Per Cent of Area Searched	Number of Nests Found	Per Cent of Nests Found
0-30	154,450	35.4	59	36.4
31-60	99,700	22.9	57	35.2
61-90	76,050	17.4	26	16.1
91-120	52,200	12.0	11	6.8
121-150	31,875	7.3	3	1.9
151-180	15,750	3.6	4	2.5
181-220	6,000	1.4	1	0.6
Total	436,025	100.0	162	99.5

2. Manipulation of Pheasant Habitat

D. E. Newman

The vegetation in 88 randomly selected 1/4-meter quadrat samples in the manipulated roadside plots was measured during June to evaluate objectively the success of the seeding and the presence and relative importance of other plant species. Tame grasses were present in 99 per cent of the quadrats. Oats, alfalfa, and clover had frequencies of 98 per cent. Bindweed and ragweed ranked highest among the annual weeds in occurrence, each having frequencies of 32 per cent. Pigweed, smartweed, lambsquarters, and butterprint had frequencies of 24, 23, 20, and 16 per cent, respectively. Although over 20 species of annual weeds were present in the test plots, these plants were primarily dominated by the cover crop of

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oats. Measurement of the vegetative "top cover," an expression of relative dominance of a plant species, indicated grasses, oats, alfalfa, and clover as dominants in decreasing order.

A strip of cover, one yard wide, along road-shoulders on all manipulated and control plots was mowed during June. This responsibility was undertaken by the project to enhance farm and roadside beautification. This and other factors affecting public relations must be given continual consideration in a project of this nature.

3. Extension of Pheasant Range

J. A. Harper, W. L. Anderson

The population of breeding hens on the Neoga study area in 1962 has been tentatively estimated at 346 birds, which is 45.4 per cent greater than the 1961 population of 238 hens. This 1962 estimate was based on the number of territorial cocks located during the spring (121 cocks) multiplied by the winter sex ratio (2.86 hens per cock) which was obtained from the estimated winter population of native birds (248 cocks and 400 hens), and the number of Kansas pheasants (40 cocks and 248 hens), Japanese green pheasants (32 cocks and 118 hens), and California pheasants (150 hens) released during the winter.

Although the breeding population has increased from 1961 to 1962, data obtained from nests found by searching hayfields after the hay had been mowed, raked, and removed indicates that the density of established nests was similar in both years. The density of nests per 100 acres of hay was 5.9 and 6.1 in 1961 and 1962, respectively. Thus, it appears that from 1961 to 1962, the breeding population has not only increased but also has become more widely distributed. The distribution of territorial cocks located on the area in 1961 and 1962 substantiates this finding. In 1961, 88 territorial cocks were located in 26 sections (3.4 cocks per section) while in 1962, 121 territorial cocks were located in 34 sections (3.6 cocks per section). These findings suggest that pheasants at Neoga tend to disperse rather than increase in population density.

4. Rabbit Management

G. C. Sanderson, D. Casteel

Mr. William R. Edwards, formerly with the Ohio Department of Conservation, has been employed as leader of this project and is expected to report for duty on July 1.

During the past month the annual Job Completion Report was prepared and submitted for this project. The following statements are taken from the abstract of that report:

During the past year the "usual" situation prevailed with the 4-H area hunted and the Sanctuary area closed to hunting. Based on censuses of yellow-tailed rabbits on the 4-H area, the winter mortality rate averaged 85 per cent during the 4 years when hunting was permitted on the area and dropped to 68 per cent in 1960-61 when hunting was not allowed on the area. Hunters removed an average of 48 per cent of the fall population of rabbits on the 4-H area when it was hunted; however, it is obvious that hunting mortality replaces much of the natural mortality which occurs when rabbits are not shot.

Figures obtained for the Sanctuary area show that opening the area to hunting during the 1960-61 season did not change the total mortality rate although hunters caused an estimated 44 per cent of the fall population to die.

The project assistant has obtained 33 rabbits for use in the reproductive phase of this project. Thirty are being held for future use and three are currently under observation and study in the enclosure.

5. Investigations of Furbearers

R. J. Ellis

Approximately 1,500 raccoons from two large fur houses were selected at random and autopsied during the fur season of 1961-62. It was possible to separate 1,436 of these into sex and age classes. The resulting data were arranged to show changes in the sex ratio which might be attributed to age classes, hunting zones, or hunting periods, Table 2. According to information in Table 2, a noticeable tendency existed in both zones for females to be harvested earlier than males. When the entire season is considered, the sex ratio in the sample was nearly 1:1. The only exception to this condition concerns juveniles from the southern zone where a ratio of 1.25 males per female occurred in the sample.

Table 2. --Sex ratios of 1,436 raccoons examined at the Bauer Fur Company, southern hunting zone, during the 1961-62 fur season and expressed as males per female.

Period and Classification	Northern Hunting Zone	Southern Hunting Zone	Entire State
<u>First Half of Season</u>			
Postyearlings	0.72 (98)*	0.44 (88)	0.58 (186)
Preyearlings	0.71 (280)	1.08 (245)	0.86 (525)
All	0.71 (378)	0.86 (333)	0.78 (711)
<u>Second Half of Season</u>			
Postyearlings	1.42 (138)	1.28 (182)	1.34 (320)
Preyearlings	1.42 (189)	1.48 (216)	1.45 (405)
All	1.42 (327)	1.38 (398)	1.40 (725)
<u>Entire Season</u>			
Postyearlings	1.07 (236)	0.91 (270)	0.98 (506)
Preyearlings	0.94 (469)	1.25 (461)	1.08 (930)
All	0.98 (705)	1.11 (731)	1.04 (1,436)

*Numbers in parentheses indicate sample size.

6. Waterfowl Inventory

F. C. Bellrose

Project inactive during June.

7. Wildlife-Insecticide Relationships

R. W. Lutz

Mole populations were adversely affected by the application of insecticides on the Donovan, Iroquois, and South Sheldon areas. The Donovan and Iroquois areas were treated with 2 pounds of aldrin per acre in the spring of 1960 and 1961, respectively. The South Sheldon area was treated with 2 pounds per acre of aldrin in the fall of 1961.

Mole tunnels were frequently encountered in fields and farmyards prior to the application of the insecticides on the study areas. After treatment mole sign declined steadily. A caretaker at a golf course within the Iroquois area stated that moles caused extensive damage to the greens prior to treatment. After treatment, mole damage was negligible. Residents on the treated areas who had mole control problems in their yards reported similar experiences.

Fifty-six farmyards on each of the Donovan and Iroquois areas were checked for mole activity during October, 1961, and April, 1962. An equal number of farmyards were checked on the untreated Beaverville area. The South Sheldon area was checked for mole activity in October, 1961, before the area was treated and after treatment in April, 1962. The decline in mole activity on treated areas is evident from the data in Table 3.

Table 3. --Mole occurrence on 112 treated and 112 untreated farmyards during October, 1961, and on 168 treated and 56 untreated farmyards during April, 1962.

	Treated			Untreated	
	Iroquois	Donovan	South Sheldon	Beaverville	South Sheldon
Mole Occurrence (Per Cent)					
October, 1961	42.9	30.0	----	89.3	73.7
April, 1962	51.7	26.7	60.7	91.0	----

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating
Thomas G. Scott, Editor

Urbana, Illinois

July, 1962

Vol. 5, No. 7

1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

The number of pheasant broods (72) observed along 320 miles of standardized roadside routes on the Sibley area during July, 1962, was 13.3 percent less than the number of broods (83) recorded during July, 1961; in July of 1959 and 1960, comparable counts of 52 and 82 broods were recorded, respectively. The mean age of the broods observed was 5.3 weeks in 1961, and 4.6 weeks in 1962, which tentatively suggests a slightly later hatch of chicks in 1962.

2. Manipulation of Pheasant Habitat

D. E. Newman

Pheasants established more nests along roadsides which were older ecologically than along recently graded roadsides. Thus far in 1962 (July 30), pheasants established 2.6 nests per mile along $5\frac{1}{2}$ miles of roadside that has not been disturbed for 2 or more years; the density of nests in this roadside cover was about 2 per acre. In contrast, only 0.7 nests per mile were established by pheasants along $1\frac{1}{2}$ miles of roadsides graded within the past year. (These data do not include the experimental roadsides which were manipulated and seeded to grasses and legumes this past spring.) The older roadsides are commonly dominated by grasses whereas the recently graded (but not seeded) roadsides were characterized by denuded areas and annual weeds. However, it is most probable that recently graded roadsides, if seeded to grasses and legumes, would provide suitable nesting cover for pheasants sooner than if the roadsides were allowed to revert to grass vegetation naturally.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, J. A. Harper

Analyses of soil and grit samples collected from the Neoga study area, which is south of the contiguous range occupied by pheasants in Illinois, and the Sibley area, which is in the heart of the occupied range, have revealed that calcite (grit containing high amounts of calcium carbonate) is equally available to pheasants on both areas (see Monthly Wildlife Research Letters, Vol. 4, Nos. 9 & 10). Further, analyses were conducted this month to determine the percentages of calcium present in the calcite contained in road gravel, field gravel, and grit from gizzards of hens (during May and June) collected on the Neoga and Sibley areas, Table 1.

These results strongly indicate that pheasant hens are capable of selecting high quality calcareous grit on both areas. The equal amounts of calcium in the calcareous grit in the gizzards of hens during the nesting season also suggests that sufficient calcium is present on the Neoga study area for successful reproduction. These data strongly suggest that a deficiency of calcium is not a major

factor in limiting the successful establishment of pheasants on areas of older glacial till south of the contiguous range occupied by pheasants in Illinois.

Table 1. --The percentage of calcium present in calcite contained in road gravel, field gravel, and grit from gizzards of hens during the laying season, Neoga and Sibley study areas.

Source of Calcite Grit	Percentage of Calcium in Calcite	
	Neoga	Sibley
Gravel roads (oiled at Neoga)	19.7	34.7
Dirt roads	27.1	26.2
Blacktop roads (shoulders)	24.6	37.0
Field gravel from soil samples	37.8	37.3
Gizzards of adult hens (May & June)	35.5	35.6

4. Rabbit Management

W. R. Edwards, D. A. Casteel

The project leader reported for duty July 1 and spent several days reviewing past project accomplishments, becoming acquainted with personnel and facilities, and visiting the study areas.

Approximately 30 additional cottontails were obtained for the reproductive phase of this project. Observations of previously obtained rabbits were continued by the assistant project leader.

A note was prepared for submission to the Journal of Mammalogy for publication concerning observations made on 15 juvenile cottontails in one nest. Findings substantiate that at least two adult females were actively associated with the feeding of the young in this nest.

Detailed planning was begun on the study of supplementary feeding to reduce rabbit damage to the home landscape, gardens, nursery and forest plantings.

Work was initiated on an inventory technique which would yield a population estimate on the basis of capture frequency. Methods now in use provide estimates based on the proportion of marked individuals recaptured. Current methods are weak in that there is a bias of unknown magnitude in all estimates which originates from differential trap response evidenced by the individual rabbits in any cottontail population. The extent of bias is not consistent and always results in an underestimate of the actual number of rabbits present. Preliminary tests of the new method are encouraging.

5. Responses of Bobwhites and Prairie Chicken to Habitat Manipulation

J. A. Ellis, R. J. Ellis

The objective of this project, initiated July 1, 1962, is to test the ability

of bobwhites and prairie chickens to respond to manipulation of agricultural habitat and to study the population responses of these species with respect to land-use practices. Initially, field work will be concerned with locating the remaining flocks of prairie chickens within the south-central counties of Jasper, Wayne, Marion, Effingham, Fayette, Richland, Clay, Clark, and others. These counties contain the majority of the remaining prairie chickens within the state.

In order to study the population responses of these species to a management program, tracts of grassland or other potential nesting cover will be leased in a strategically located area, containing both bobwhites and prairie chickens, for the purpose of providing undisturbed nesting cover. A control or check area will also be selected for comparative study.

6. Wildlife-Insecticide Relationships

R. W. Lutz

Roadside cock-crowing counts were conducted along a nine-stop route on the Donovan and Beaverville areas from March-July, 1960-62, and on the Iroquois area from March-July, 1961-62.

The Donovan and Iroquois areas were treated with 2 pounds of aldrin per acre in the spring of 1960 and 1961, respectively. The Beaverville area was not treated in 1960, 1961, or 1962.

The average number of two-syllable cock-calls heard per two-minute period during the months of greatest crowing activity (April-June) were used as an index to the abundance of territorial cocks on the study areas (Table 2).

Table 2. --Pheasant crowing count indices on the Donovan, Beaverville, and Iroquois areas during 1962, with comparative data from 1960 and 1961.

Area	1960	1961			1962		
	Index	Index	Index Change	Percent Change	Index	Index Change	Percent Change
Donovan	6.4*	6.9†	+0.5	+ 7.8	10.3	+3.4	+49.4
Beaverville	3.1	6.0	+2.9	+93.5	8.2	+2.2	+36.7
Iroquois	No data	8.0*	---	----	6.9†	-1.1	-13.8

*Year of treatment

†Year after treatment

In 1960, the Donovan index was 106.4 percent greater than the Beaverville index. In 1961, however, although more than 500 cocks were released on the Donovan area after the 1960 hunting season, the Donovan index had increased only 7.8 percent over the 1960 index. In comparison, the 1961 index on the untreated Beaverville area was 93.5 percent greater than in 1960. Further, the 1961 Donovan index was only 13 percent greater than the 1961 Beaverville index, a decrease of 93.4 percent from 1960.

These data suggest that in 1961, the relative abundance of territorial cocks

on the Donovan area remained approximately the same as in 1960, while on the untreated Beaverville area the number of territorial cocks was about twice that of 1960.

The 1961 index on the Iroquois area was 16 percent greater than that of the Donovan area and 33.3 percent greater than that of the Beaverville area. In 1962, however, the Iroquois index decreased 13.8 percent from 1961, while the Donovan and Beaverville indices increased 49.4 and 36.7 percent, respectively.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Thomas G. Scott, Editor

Urbana, Illinois

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Vol. 5, No. 8

1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

The standardized counts of pheasant broods taken on the Sibley area during July and August, 1962, revealed 12.6 per cent fewer broods than recorded in 1961. The number of broods observed along 640 miles of roadside transect (two, 40-mile routes driven weekly) was 249 broods in 1962 compared to 285 in 1961; comparable counts were 235, 198, 240, and 194 broods in 1960, 1959, 1958, and 1957, respectively.

The number of adult pheasant hens observed during July and August along these same 640 miles of roadside decreased from 478 hens in 1961 to 374 hens in 1962, or 21.8 per cent. A total of 43.5 per cent of the adult hens observed in 1961 were broodless compared to 42.8 per cent in 1962.

These data indicate a decrease in both the adult hen population and the production of young pheasants on the Sibley study area in 1962.

2. Manipulation of Pheasant Habitat

D. E. Newman

Roadside observations of pheasant broods indicate that broods utilized manipulated plots to a significantly greater extent than unmanipulated plots, Table 1. Ninety-one per cent of the broods observed occurred in or opposite manipulated plots. However, these data do not consider the influence that types of agricultural crops located adjacent to the roadside plots may have exerted on brood movements.

Table 1. --Observations of broods along 7 miles of roadway, containing both manipulated and unmanipulated plots.

Location of Broods	Percentage of Roadsides	Number of Broods*		Percentage of Total Broods Seen
		Seen	Theoretical	
In or opposite seeded (one side) plots	50	87	72	60
In seeded (both sides) plots	25	44	36	31
In control (both sides) plots	25	13	36	9
Total	100	144	144	100

* Chi-square value = 19.58 with 2 d.f. Ref. χ^2 .005 = 10.60. This Chi-square value indicates that it is highly probable that pheasant broods utilized manipulated plots to a greater degree than would be expected on the basis of random occupancy.

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The manipulated plots may have "attracted" broods because (1) the oats nurse crop and grass-legume seedings in the manipulated plots provided cover more dense than in the unmanipulated plots, and (2) the seedings also attracted large populations of insects which probably provided abundant food.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, J. A. Harper

The average number of eggs per incubated clutch and the average number of eggs hatched per successful nest recorded from pheasant nests found on the Neoga area in 1960, 1961, and 1962 (Table 2), are comparable to incubated and hatched clutches reported from within the established pheasant range. These data do not preclude that reproduction is not limiting the establishment of pheasants in unoccupied range, but rather that the production of chicks is adequate among that segment of the hen population that is known to nest. However, an average of 62 per cent of the hens observed during the summers were accompanied by broods, which indicates that an adequate segment of the hen population produced chicks. It is also noteworthy that the pen-reared birds ("California" and Japanese green pheasants) laid smaller clutches than the wild-reared birds (wild-trapped and "native" pheasants).

Table 2. --The average number of eggs per incubated clutch and the average number of eggs hatched per successful nest on the Neoga study area, 1960, 1961, and 1962. Sample sizes (number of nests) in parentheses.

		Years			
Origin of Hens		1960	1961	1962	All Years
Mean	"California"	10.5 $\pm$.5(2)	8.0 (1)	7.0 (1)	9.0 $\pm$.9(4)
Number $\pm$	Japanese green	----	----	6.0 (1)	6.0 (1)
Standard	Wild-trapped	10.9 $\pm$.5(16)	11.5 $\pm$.3(4)	----	11.1 $\pm$.4(20)
Error of eggs	"Native"	----	10.2 $\pm$ 1.1(6)	11.5 $\pm$ 1.6(6)	10.9 $\pm$.9(12)
per. incuba-	Undetermined	10.2 $\pm$.3(18)	9.8 $\pm$.4(6)	9.4 $\pm$ 1.0(12)	10.4 $\pm$.4(36)
ted clutch	All hens	10.6 $\pm$.3(36)	10.2 $\pm$.4(17)	10.8 $\pm$.8(20)	10.5 $\pm$.3(73)
Mean number $\pm$ standard error of eggs that hatched per successful nest		9.4 $\pm$.7(8)	9.5 $\pm$.5(4)	9.4 $\pm$ 1.0(12)	9.4 $\pm$.5(24)

4. Rabbit Management

W. R. Edwards, D. A. Casteel

The observation phase of the study of cottontail reproductive behavior was discontinued during the latter part of the month when bucks became sexually inactive. Results of this summer's work were largely inconclusive as a result of the late initiation of field work and the difficulty experienced in attempting to obtain suitable numbers of does of reproductive age that were not pregnant. Losses of study animals to avian predation further limited study. Present plans call for future work on this study to be conducted in the Urbana area and for experimental animals to be collected prior to the 1963 rabbit reproductive season.

Two hundred rabbit traps were constructed by project personnel during the month. These will be used to inventory cottontail populations and collect experimental animals on the various studies and management evaluations which comprise objectives of the rabbit project.

Detailed planning was continued on the study to evaluate supplementary feeding to reduce rabbit damage to the home landscape, gardens, nursery, and forest plantings. Planning was initiated on the study of rabbit population dynamics in response to hunting. Planning was also initiated on the evaluation of effects of habitat manipulation on cottontail abundance.

5. Responses of Bobwhites and Prairie Chicken to Habitat Manipulation

J. A. Ellis, R. J. Ellis

Experience gained while night-lighting pheasants suggests that bobwhites can be successfully captured by night-lighting during the late summer and early fall. Consequently, a vehicle was outfitted for capturing quail and prairie chickens by night-lighting. Plans were formulated for censusing prairie chickens in the east-southeast region of the state.

6. Wildlife-Insecticide Relationships

R. W. Lutz

Pheasant brood counts were conducted on the Donovan, Beaverville, and Iroquois areas during July and August. The Donovan and Iroquois areas were treated with 2 pounds per acre of aldrin during the spring of 1960 and 1961, respectively. The Beaverville area was not treated in 1960, 1961, or 1962.

The number of pheasant broods observed per mile on the Donovan area in 1962 (0.111) was 56.3 per cent greater than in 1961 (0.071) and 217.1 per cent greater than in 1960 (0.035). A total of 16.8 per cent of the hens observed on the Donovan area in 1962 were broodless compared to 18.7 per cent in 1961 and 43.4 per cent in 1960, the year of treatment.

The number of pheasant broods observed per mile on the Beaverville area in 1962 (0.110) was 11.1 per cent greater than in 1961 (0.099) and 139.1 per cent greater than in 1960 (0.046). A total of 19.0 per cent of the hens observed on the Beaverville area in 1962 were broodless compared to 16.8 per cent in 1961 and 34.6 per cent in 1960.

The number of pheasant broods observed per mile on the Iroquois area in 1962 (0.118) was 372 per cent greater than in 1961 (0.025). A total of 18.1 per cent of the hens observed on the Iroquois area in 1962 were broodless compared with 45.5 per cent in 1961, the year of treatment.

In 1962, the average brood size for all ages, for those broods for which complete counts were possible, on the Donovan, Iroquois, and Beaverville areas was 7.6, 8.5, and 7.6 chicks, respectively.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott and Wendy Patton, Editors

Urbana, Illinois

September, 1962

Vol. 5, No. 9

1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

Pheasant nesting and its relation to pheasant abundance and land use on the intensively cultivated Sibley area was investigated again in 1962. The 100 randomly selected 10-acre study plots (representing a 4.3 per cent sample of the 23,200 acre study area) were searched for nests. In 1962, 470 nests were located and 103 (21.9 per cent) of these nests hatched. The number of nests (470) located in 1962 represents the greatest number of established nests found during the past 6 years on the 1,000 acres sampled (Table 1), but the number of hatched nests (103) reported in 1962 was 6.4 per cent below the record number of hatched nests (110) found in 1961.

Table 1. --Densities of established and hatched pheasant nests, Sibley study area, 1957-1962.

Year	Densities: Nests per 100 Acres of Land Area	
	Nests Established	Nests Hatched
1957	12.4	4.2
1958	26.6	7.9
1959	23.6	5.6
1960	28.0	8.5
1961	43.7	11.0
1962	47.0	10.3

2. Manipulation of Pheasant Habitat

D. E. Newman

Thirty-seven per cent of 38 pheasant nests found along roadsides during the 1962 nesting season hatched, whereas 26 per cent of the nests were abandoned and 37 per cent were abandoned and/or destroyed. The average number of eggs in hatched nests was 10; the average number of chicks hatched per nest was 8.6.

Nest densities along ecologically older roadsides ($5\frac{1}{2}$ miles of roadway) averaged 6.7 per mile. Less than one nest per mile was established along recently graded roadsides ($1\frac{1}{2}$ miles of roadway).

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3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, J. A. Harper

An analysis of data obtained from broods observed on the Neoga area in 1960, 1961, and 1962 (Table 2) revealed that the average number of chicks per brood was similar to that for an established pheasant range north of the study area. Broods 12 weeks of age contained, on the average, 1.9 fewer chicks than broods between hatching and 3 weeks of age. The mortality of chicks between hatching and 12 weeks of age averaged 19.6 per cent during the 3 years. These findings suggest that chick mortality on the Neoga area is not excessive.

Table 2. --Mean number of chicks observed per brood at various ages (includes repeat observations of individual broods), Neoga study area, 1960, 1961, and 1962. Sample sizes (number of broods) are in parentheses.

Age in Weeks	Mean Number of Chicks in Broods			
	1960	1961	1962	All Years
0-3	9.5(4)	9.0(2)	10.0(6)	9.7(12)
4	5.2(5)	4.5(2)	10.0(4)	6.8(11)
5	5.6(5)	5.2(5)	5.3(3)	5.4(13)
6	6.6(5)	5.0(1)	6.3(3)	6.3(9)
7	9.4(11)	7.8(8)	6.0(5)	8.1(24)
8	7.0(6)	6.3(4)	5.2(6)	6.1(16)
9	6.6(8)	7.5(6)	8.3(4)	7.3(18)
10	5.0(1)	7.4(5)	5.5(4)	6.4(10)
11	9.8(4)	7.8(6)	(0)	8.6(10)
12	6.7(3)	7.8(4)	8.0(3)	7.8(10)
Average Size	7.4(52)	7.1(43)	7.2(38)	7.3(133)
Average Age	7.1 weeks	8.1 weeks	6.8 weeks	7.4 weeks

4. Rabbit Management

W. R. Edwards, D. A. Casteel

A trapping quadrat of 160 acres was laid out on the 4-H area of Allerton Park to facilitate cottontail ecology studies. Intersecting transect lines, which will serve as reference points during future work, grid the area into 100 plots of 1.6 acres each. Traps were distributed at the rate of two per plot along the transect lines at points selected using random sampling techniques. Trapping began September 12 with 30 rabbits tagged, color marked, and released at their points of capture as of September 28. Data are insufficient to warrant population estimates at this time.

Scotch pine and multiflora rose have been ordered and will be planted for an evaluation of winter feeding as a method of controlling cottontail depredations. Eighteen study plots have been selected to date.

A continuous roadside census route covering 16 sections was tentatively established to facilitate the evaluation of the effects of future prairie chicken management programs on the abundance and distribution of cottontails.

Use of the weight of the cottontail lens as an indicator of age is now a standard practice. Techniques were developed this month for adjusting the lens histogram to remove bias in dating seasonal peaks of productivity caused by the continuously changing growth rate of the lens throughout the life of the rabbit.

The most satisfactory histogram results when individual weights are first converted to ages using the equation:

$$x = (68.7927 / 2.4890 - \log_{10} y) - 41$$

Here x = the age of the rabbit in days and y = the weight of the lens in mg.

It has been common practice to use histograms based on weights of lenses tabulated by 10 mg. classes. Such data must be adjusted if seasonal aspects of production are to be properly presented. Because of the continuously changing growth rate of the cottontail lens, there is a different time span represented by each 10 mg. class in the unadjusted histogram, i.e., the time interval represented by the 70-80 mg. class is 10.6 days while the interval represented by the 170-180 mg. class is 28.4 days. A conversion table is given below. Classes are adjusted by dividing the number of lenses in each class by the appropriate correction factor.

Table 3. --Correction factors for adjusting frequencies of weights of cottontail lenses tabulated by 10 mg. classes for histogram presentation.

Weight Classes (mg)	Correction Factors	Weight Classes (mg)	Correction Factors
20-30	10.1	120-130	15.5
30-40	9.6	130-140	17.2
40-50	9.5	140-150	19.3
50-60	9.7	150-160	21.4
60-70	10.0	160-170	24.5
70-80	10.6	170-180	28.4
80-90	11.2	180-190	32.9
90-100	12.1	190-200	39.0
100-110	13.0	200-210	46.5
110-120	14.2		

Due to variability in lens growth rates among rabbits, it is suggested that estimating individual ages in days be limited to young of the year, i.e., those having lenses weighing less than 210 mg.

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5. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

Thirty-eight prairie chickens were located when 132 acres of roosting cover near Bagota, Illinois, were searched by nightlighting on September 21. This served to test the suitability of the technique for censusing and capturing prairie chickens and also provided some information on the roosting habits of prairie chickens during September. No attempt was made to capture any of the birds, but they appeared to be vulnerable to capture by nightlighting.

Three classes of roosting cover were cruised. Fields of wheat and oat stubble with grass-legume seedings, which were mowed in late summer for weed control, constituted 38.6 acres. These fields were characterized by heavy growths of a grass-clover mixture, 6 to 10 inches tall. Fields of similar composition, which had not been mowed, constituted 67.1 acres. These fields primarily contained heavy growths of clover, 8 to 10 inches tall, and ragweeds, 24 to 36 inches tall. Smartweeds, barnyard grass, and panic grass were also common. The third class of roosting cover was comprised of 26.5 acres of dense redtop grass stubble, about 10 inches tall, broomsedge, and numerous small flowering composites.

The unmowed stubble clover seedings contained about nine times as many roosting prairie chickens as the mowed stubble clover seedings, Table 4. No prairie chickens were observed in the redtop grass.

Table 4. --Numbers of roosting prairie chickens observed during nightlighting operations near Bagota, Illinois, September 21, 1962.

Cover Type	Mowed Clover Seeding	Unmowed Clover Seeding	Redtop Grass Stubble	Total
Acres nightlighted	67.1	38.6	26.5	132.2
Number of prairie chickens observed	6	32	0	38
Prairie chickens per acre	0.09	0.83	0.00	0.28



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MONTHLY WILDLIFE RESEARCH LETTER

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1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

Studies of the nesting ecology of pheasants on the Sibley area indicated that the number of established nests in unharvested hayfields (199.8 per 100 acres) was 27.9 percent higher than in harvested hayfields (156.2 per 100 acres) during the years 1957-62. Unharvested hayfields yielded 75.7 hatched pheasant nests per 100 acres compared to 29.4 hatched nests per 100 acres in harvested (mowed) hayfields. Thus, unharvested hay produced 46.3 (158 percent) more hatched nests per 100 acres of cover than harvested hay. In unharvested hayfields 37.9 percent of the established nests hatched compared to only 18.8 percent in harvested hayfields.

2. Manipulation of Pheasant Habitat

D. E. Newman

Pheasants exhibited different seasonal timing in their establishment of nests in seeded and control plots along 7 miles of roadway being experimentally managed to provide nesting cover for pheasants. The seasonal progression of nest establishment indicates that pheasants utilized seeded plots for nesting during a longer period of time than they utilized control plots; the midpoint of nest establishment in test plots occurred about 3 weeks after the midpoint of nest establishment in control plots. Pheasants established nests in control plots during a period of about 13 weeks, with the midpoint occurring on May 28. In contrast, nest establishment in test plots spanned a period of about 17 weeks, with the midpoint occurring on June 16.

The overall peak of nest establishment, which occurred during June on the roadsides (Table 1), may be partially attributed to at least two factors: (1) The newly seeded portions of the test plots did not provide adequate nesting cover until June. (2) Roadsides may have become sites for renesting efforts by pheasants whose early nests were disrupted. The second factor would be particularly applicable to hens that established nests in hayfields which are usually mowed during early June.

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Table 1. Establishment of pheasant nests by months in seeded and control plots on roadsides, Sibley study area, 1962.

Month	Nests in Test Plots		Nests in Control Plots		Total	
	Number	Percent	Number	Percent	Number	Percent
April	1	5	2	11	3	8
May	2	11	10	52	12	32
June	11	58	5	26	16	42
July	4	21	2	11	6	16
August	1	5	0	--	1	2
Total	19	100	19	100	38	100

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, J. A. Harper

Stubble fields on the Neoga area, south of the range occupied by pheasants, were cruised with a mobile nightlighting unit between July 30 and September 7, 1962, to locate roosting pheasants, and thereby gain refined data on production of chicks. Thirty adult pheasants (7 cocks and 23 hens) and 216 chicks (35 broods) were observed during 29 hours and 15 minutes of nightlighting, an average of 1 observed pheasant per 7.1 minutes of searching. An average of 9.3 chicks were observed per adult hen, indicating that productivity per surviving adult hen was exceptionally high on the area during the 1962 breeding season.

4. Rabbit Management

W. R. Edwards, D. A. Casteel

Fifty-three rabbits on the 4-H area of Allerton Park were marked and released at their points of capture during October. Cottontails handled prior to October 15 had their tails dyed yellow; rabbits trapped after that date were marked with black dye. Red dye will be used in November. The different tail colors will allow estimates of both population and mortality.

Table 2 presents a summary of October trapping on the 4-H area for the years 1957-62. Area rabbit populations were subjected to hunting mortality in all years but 1960. The data suggest that cottontail abundance fluctuates markedly from fall to fall independent of fall and winter mortality.

Since the weight of a juvenile rabbit is related to its age, weights can be used to provide limited information on the age composition of a cottontail population. For example, where nutrition is not a limiting factor, a low mean weight reflects variability among the weights, thus ages, of cottontails in a sample. The larger the standard error, the greater the range of ages represented by the sample. Table 3 shows weights of cottontails handled during October on the 4-H area. These data suggest relatively little difference in age composition of cottontail populations from 1957-62.



Table 2. Results of October rabbit trapping on the 4-H area from 1957-62.

	1957	1958	1959	1960	1961	1962
Rabbits Tagged (A)	84	104	49	48	94	43
Total Captures (B)	135	145	56	58	160	65
Capture Frequency (B/A)	1.61	1.39	1.14	1.21	1.70	1.51
Estimated Spring Populations*	47	31	132	56	162	24
Estimated October Populations†	119	201	191	133	116	72

* Estimated from drive census.

† Estimated from trapping results using Schnable's method.

Table 3. Mean weights of cottontails trapped on the 4-H area during October from 1957-62.

	1957	1958	1959	1960	1961	1962
Animals Weighed	83	104	49	50*	92	40
Mean Weight (oz)	34.1	35.6	35.1	32.6	37.0	32.5
Standard Error	10.8	11.1	13.1	10.9	9.6	12.24

* No trapping during the period October 19-31, 1962.

Sex ratios of rabbits trapped on the 4-H area in October are given in Table 4. Whether the uneven sex ratios are caused by differences in trap response or by a real preponderance of females is not known.

Table 4. Sex ratios of cottontails trapped on the 4-H area during October from 1957-62.

	1957	1958	1959	1960	1961	1962
Animals Sexed	85	104	49	51	96	41
Males	40	49	15	30	46	15
Females	45	55	34	21	50	26
Male:Female Ratio	47:53	47:53	31:69	59:41	48:52	37:63

The fall trapping inventory of cottontails on the Sanctuary area of Allerton Park began October 23. Thirteen rabbits were marked and released during the first week of trapping.

Roadside surveys of study areas in Jasper, Cumberland, and Ford counties were started in late October to provide indices of cottontail abundance. When analyzed with information on land use, cover association, age composition, and sex ratios, the rabbit density data will provide a basis for evaluating rabbit-environment relationships.

5. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

An initial attempt to capture prairie chickens by the nightlighting method was made October 20, 1962, near Newton, Illinois. At least 52 prairie chickens were flushed when 106 acres of stubble, hay, and soil bank habitat were cruised; no quail were observed. Six of the 52 prairie chickens were captured, marked, and then released. Some modifications of the nightlighting technique should render it more useful for capturing prairie chickens in the future.

The six captured prairie chickens included two juvenile females, one adult female, and three adult males. The adults averaged 2.3 lbs and the juveniles averaged 2.0 lbs in weight. Most of the prairie chickens observed were roosting in mixtures of grass, clover, and weeds, 16 to 30 inches tall. Fields with shorter cover yielded few or no prairie chickens.

MONTHLY WILDLIFE RESEARCH LETTER

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T. G. Scott and Wendy Patton, Editors

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1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

A ratio of 5.0 young pheasants per adult hen existed among the 1,821 pheasants captured by nightlighting, marked, and released on the Sibley area during October and early November, 1962. This prehunt age ratio represents the highest measure of productivity recorded during the past 6 years, Table 1. Age ratios within sexes were 2.6 young hens per adult hen and 12.8 juvenile cocks per adult cock. The prehunt population, including young and adults, was comprised of 41.7 percent cocks and 58.3 percent hens. Among juveniles, 48.0 percent were cocks.

Table 1. The sex and age structure of the prehunt populations of pheasants, Sibley area, 1957-62.

	1957	1958	1959	1960	1961	1962
Percentage of Cocks*	41.5(212)	40.7(354)	44.3(183)	45.3(181)	39.3(369)	41.7(1,821)
Percentage of Juveniles*	71.2(212)	78.2(354)	71.0(183)	72.4(181)	74.8(369)	80.1(1,821)
Juveniles of Both Sexes Per Adult Hen†	3.2(47)	4.4(63)	3.2(41)	3.1(43)	3.3(83)	5.0(292)

* Sample sizes (number of pheasants) in parentheses

† Sample sizes (number of adult hens) in parentheses

2. Manipulation of Pheasant Habitat

D. E. Newman

The location of 38 pheasant nests along both sides of 7 miles of roadway studied during 1962 suggested that pheasants established more nests along roadside fencerows than in the remaining portions of the roadway, including shoulders and ditch bottoms. The roadsides were divided into 1/8- or 1/4-mile plots; half of the plots were manipulated for the purpose of improving nesting cover and half were designated as control plots. Fencerows comprised only 25 percent of the roadside areas but contained 42 percent of the established nests found in control plots and 68 percent of the established nests found in manipulated plots. The density of nests in control plots was 2.1 nests per acre in fencerows and 1.0 nest per acre in the remaining portion of the roadside. The density of nests in manipulated plots

was 3.4 nests per acre in fencerows and less than 1 nest (0.5) per acre in the remaining portion.

Differences in nest density between fencerows and the remaining portion of the roadside were greater in manipulated plots than in control plots. The mechanical disturbance of habitat manipulation and the associated lack of nesting cover on the manipulated plots early in the nesting season may have influenced pheasants in their choice of nesting sites. However, variation in nest density on control plots between fencerows and the remaining area indicates a greater utilization, and perhaps a selection, of fencerow vegetation by nesting pheasants.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, J. A. Harper

Calcium analysis of grit removed from the gizzards of 11 juvenile pheasants 6-8 weeks old on the Sibley area revealed that grit in the gizzard contained 4.9 percent calcium (Table 2). Analysis of the food items from the crops of these birds indicated an additional 0.32 percent calcium. The level of calcium in the contents of the gizzards of these wild juvenile pheasants is greater than the 1.5 percent reported to be needed in the diet of pen-reared juvenile pheasants. Nutritional requirements of penned juveniles may be lower than those of young pheasants in wild populations.

Table 2. Calcium contents of calcareous grit from gizzards of 127 juvenile pheasants from the Sibley study area, 1961-62. Sample sizes in parentheses.

Age of Birds (Months)	Average Weight of Grit (g)	Percentage of Calcite in Grit	Percentage of Calcium in Grit	Mg of Calcium per Kg Body Weight
2* (11)	2.8	13.9	4.9	500.0
3† (16)	2.2	3.1	1.1	96.0
4 (12)	2.5	0.7	0.3	10.4
5 (10)	2.1	0.4	0.1	4.2
6 (35)	2.7	0.5	0.2	6.9
7 (18)	2.3	0.2	0.1	2.8
8 (8)	3.1	Tr	Tr	Tr
9 (9)	4.7	Tr	Tr	Tr
10 (8)	4.1	Tr	Tr	Tr
Average	3.0	2.1	0.7	68.9

* 6-8 weeks

† 9-12 weeks

4. Rabbit Management

W. R. Edwards, D. A. Casteel

Trapping and marking cottontails for the preseason census of the Allerton Park study areas was completed November 13. The drive census took place November 18.

As anticipated, the rabbit populations on both the 4-H and Sanctuary areas were well below those of 1961. In fact, these two areas had the lowest fall populations since the study was initiated in 1957. The population estimate for the 4-H area, with 95 percent confidence limits, was 107 ± 24 cottontails. Since the study area covers 160 acres, the mean density was estimated to be $0.67 \pm .15$ rabbits per acre. There were 71 ± 19 rabbits estimated to be present on the 100 acre Sanctuary area. On this area mean density was $0.71 \pm .19$ cottontails per acre. Data on spring and fall cottontail abundance for the two study areas during the 6 years of the study are given in Table 3.

Table 3. Summary of cottontail populations on Allerton Park study areas, 1956-1962, as determined by color marking and drive censuses.

	1956	1957	1958	1959	1960	1961	1962
Sanctuary Area							
Spring		No Data	60	42	64	54	128
Fall		238	120	171	125	141	71
Harvest		*	*	*	42	*	In Progress
4-H Area							
Spring	No Data	47	31	132	56	161	24
Fall	333	259	324	239	309	363	107
Harvest	113	92	109	95	*	167	Closed

* Area rabbit population not subjected to controlled harvest.

If considered separately, data for the 4-H area might suggest a mortality dependent population control. However, as similar declines in rabbit abundance are apparent in the data from both areas, and since the 1962 spring cottontail population on the Sanctuary area was high, it is logical to assume that some factor other than hunting was responsible for the low rabbit densities on the area in 1962.

Collection of eye lenses from hunter-killed rabbits began in late November on the Sibley, Neoga, and Bogota study areas. A sample of at least 100 lenses will be obtained, if possible, from each area so that sufficient information on cottontail age composition in 1962 will be available for population analysis.

Controlled harvest of the cottontail population on the Sanctuary area was initiated November 17. This year a land unit of approximately 230 acres will be subjected to harvest treatment. Rabbit removal sufficient to achieve a 50 percent harvest of the estimated fall population and an 80-85 percent fall-to-spring reduction is planned. Trap removal of cottontails will supplement hunting.

5. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

Attempts were made during October and November to locate each prairie chicken flock in southern Illinois. High school vocational agriculture instructors in

school districts where prairie chickens might be found were supplied with questionnaire cards for distribution to students from rural homes.

Prairie chicken flocks were reported by 166 of the 2,080 students participating. There were 169 flock reports representing a population of 1,982 prairie chickens, Table 4. Some flocks were reported two or three times; however, we know of at least four flocks which were not reported. Fifty-two reports contained inadequate information on flock locations.

Probably 95 percent of the prairie chicken flocks were located in an area circumscribed by a line extending from Marshall to Ramsey to Greenville to Du Quoin to Fairfield to Marshall. Four major concentrations of prairie chickens were noted. One was in an area contained by a circle with a radius of 9 miles and with a center in Martinsville, Clark County. Another was on a rectangular area extending 10 miles south and 5 miles west of Newton, Jasper County. The third concentration was on an area contained in a circle with a radius of 15 miles and with a center in Cisne, Wayne County. The fourth concentration was on a rectangular area in Marion and Fayette counties, which extends 25 miles north and 15 miles east of Alma.

Table 4. Prairie chicken populations in southern Illinois according to estimates entered on questionnaire cards completed during November, 1962, by vocational agriculture students from high schools in the southern third of Illinois.*

County	Number of Flock Reports†	Average Estimated Flock Size	Total Estimated Population**
Bond	5	9.5	47
Clark	18	12.3	222
Clay	11	15.8	174
Clinton	6	7.6	46
Coles	1	1.0	1
Cumberland	7	7.1	50
Effingham	7	6.6	46
Fayette	14	10.7	149
Hamilton	1	2.0	2
Jasper	6	25.8	155
Jefferson	1	7.0	7
Marion	15	15.6	234
Montgomery	1	?	?
Perry	7	8.3	58
Richland	1	20.0	20
Washington	8	7.1	57
Wayne	<u>18</u>	<u>15.0</u>	<u>270</u>
Total	127	12.2	1,538

* Fifty-two flock reports involving an estimated 444 prairie chickens whose locations could not readily be determined from questionnaires are not included.

† Some flocks probably were reported by more than one student; however, at least four flocks were not reported.

** Flock size was not given on six reports. The estimated flock size in these cases was considered equal to the average estimated flock size for the county in which the flock was located.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott and Wendy Patton, Editors

Urbana, Illinois

December, 1962

Vol. 5, No. 12

1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

Pheasant harvest data collected on the Sibley study area from 1956 through 1962 are presented in Table 1. Information was obtained by interviewing hunters each year during the hunting season.

Table 1. Pheasant harvest data collected by interviewing hunters during the hunting seasons on the Sibley study area from 1956 through 1962.

Year	Number of Hunters Interviewed	Number of Cocks Aged by Bursal Examination	Age Ratio of Bagged Cocks Young per Adult	Gun-Hours per Bagged Cock	Cocks Crippled and Lost per 100 Downed	Percentage of Cock Population Harvested
1956	525	251	12.5	2.3	34.0	59.4
1957	443	290	4.7	3.5	24.4	12.4
1958	595	445	6.4	2.5	23.0	44.0
1959	461	454	5.6	2.9	17.8	52.5
1960	496	441	8.3	3.1	31.9	52.0
1961	443	402	7.0	2.8	20.9	77.1
1962	833	812	11.9	3.3	13.0	--

The age ratio among cock pheasants killed during the 1962 hunting season, 11.9 juveniles per adult, was the highest since 1956 when 12.5 young birds were bagged for each adult. This age ratio of 11.9 young per adult compares favorably with that of 12.8 young per adult obtained from 760 cocks captured by nightlighting prior to the hunting season. The 1962 crippling rate of 13.0 percent was the lowest rate recorded during the 7 years of the study.

Favorable hunting conditions existed in 1962; about 95 percent of the corn had been harvested by opening day, and a large amount of fall plowing was accomplished before and during the hunting season. However, except for the opening 2 days of the season, hunting pressure was light.

The success of hunters decreased during the course of the season. For example, 147 hunters interviewed on opening day bagged a cock, on the average, every hour and 42 minutes, but on the last day of the season, 51 hunters interviewed spent an average of 20 hours in the field for every cock bagged.

2. Manipulation of Pheasant Habitat

D. E. Newman

The average number of eggs per hatched pheasant nest on roadsides in the Sibley area in 1962 was larger in control plots than in test plots (Table 2). The difference in the incubated clutch size of hatched nests can be partially attributed to the phenomenon of decreasing clutch size with seasonal progression. The midpoint of nest hatching in control plots was July 4, whereas the mean hatching date of nests in test plots was July 17. A difference in vegetative conditions on control and test plots was probably the greatest factor influencing the timing of nest establishment and thus hatching. (See Monthly Wildlife Research Letter, October, 1962.)

Table 2. The average number of eggs and the average number of eggs hatched per successful nest on roadsides at Sibley, 1962.

	Number of Nests	Average Number of Eggs	Average Number Hatched
Control Plots	7	$11.5 \pm 1.66^*$	$8.7 \pm 1.77^*$
Test Plots	7	8.5 ± 0.81	7.9 ± 0.86
All Areas	14	10.0 ± 0.98	8.3 ± 0.95

* $\pm$ Standard Error

3. Factors Influencing Distribution and Abundance of Pheasants

William L. Anderson

Analysis of data obtained from hunter interviews revealed that a minimum of 106 cock pheasants were bagged on the Neoga area during the 1962 hunting season; this constitutes a kill of about 4 cocks per section for the 25 square mile area. An additional 14 cocks (11.7 percent of the total number downed) were crippled but not retrieved. Three hundred and fifty-three hunters in 150 parties expended 837 gun-hours to bag 87 cocks, an average of 9.6 gun-hours per cock. This hunting success, though considerably lower than that common in the occupied pheasant range of Illinois, did not cause local sportsmen to lose interest.

The age ratio among 81 of the cocks bagged on the area was 5.2 juveniles per adult. This age ratio, when combined with the prehunt sex ratio obtained by nightlighting, indicated that 5.0 young of both sexes were produced per adult hen and survived to the hunting season. These data suggest that excellent productivity occurred on the Neoga area in 1962.

4. Rabbit Management

W. R. Edwards, D. A. Casteel

A preliminary analysis of the age and sex composition of cottontails collected in the field (Table 3) revealed a high proportion of young-of-the-year. Such a population composition normally indicates recovery from a period of low density. The limited data available from other sources suggest that the statewide fall cottontail population was down somewhat in 1962. It is probable that the age composition reflected by our samples is a result of either (1) a low density of breeding cottontails last spring or (2) a high mortality of adults during the reproductive period.

Examination of rabbit counts made during an audio-visual pheasant census of the Sibley study area shows the average number of rabbits observed on spring counts in 1962, 23.6 per 100 miles, was considerably lower than the 54.6 rabbits observed per 100 miles on a similar census in 1961. In contrast with the spring counts, summer surveys on the Sibley area revealed the 1962 rabbit population of 28.7 cottontails observed per 100 miles to be very similar to that of 1961 when 29.7 rabbits were seen per 100 miles. These data support the previous hypothesis of population recovery from a low in the spring of 1962.

Table 3. Summary of 1962 cottontail age and sex determinations.

Area	Sample Size	Number of Adults	Number of Juveniles	Percent Juveniles	Number of Males	Number of Females	Percent Females
Sanctuary	21	2	19	90	10	11	52
Neoga*	101	9	92	91	46	49	52
Ford & Adjacent Counties	42	2	40	95	14	28	67
Total	164	13	151	92	70	88	56

* Sex identification of six specimens was not possible.

During November and December a roadside census of cottontails on the three study areas was conducted (1) to determine the relative abundance of rabbits along roadsides and (2) to aid in evaluating and developing a suitable census method for cottontails. Data were obtained along fixed routes covered between the hours of 8 PM and midnight (Table 4). Coverages were replicated six times at each study area. Analysis of variance was used to evaluate differences in rabbit counts among coverages as well as among areas.

Extreme variability in rabbit counts among coverages is apparent in the data from all areas. This variability was of a magnitude sufficient to preclude the making of satisfactorily precise statements about area rabbit populations. To accomplish the objective of developing a suitable census it will be necessary to produce a design which will allow a reduction of the error term and, thus, make possible a more critical test of differences among count data.

Table 4. Rabbits observed per 100 miles of roadside census on three Illinois study areas during late fall, 1962. Route lengths: Sibley - 91.8 miles; Neoga - 77.3 miles; Bogota - 77.0 miles. Data is presented as rabbits observed per 100 miles of census.

Coverage	Study Areas			Total
	Sibley	Neoga	Bogota	
1	32.7	51.7	57.1	141.5
2	42.5	25.9	15.7	84.1
3	33.8	56.9	27.2	117.9
4	87.1	86.7	24.7	198.5
5	66.4	24.9	26.0	117.3
6	<u>91.5</u>	<u>78.9</u>	<u>13.0</u>	<u>183.4</u>
Total	354.0	325.0	163.7	842.7

5. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

Project personnel examined several areas in Jasper and Wayne counties of south-central Illinois in the search for a permanent study area on which to initiate the habitat manipulation research for prairie chickens and quail. Each area was studied with respect to (1) land use, (2) existing populations of prairie chickens and quail, and (3) public relations.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Thomas G. Scott, Editor

Urbana, Illinois

January, 1963

Vol. 6, No. 1

1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

An estimated 15,224 pheasants (6,428 cocks, 8,796 hens), or an average of 428 per section, were present on the 37-square mile Sibley study area just prior to the 1962 hunting season. The estimate was obtained with the following ratios:

$$(1) \frac{\text{Number of Tagged Cocks Shot by Hunters Interviewed (96)}}{\text{Number of Cocks Tagged during Prehunt Period (760)}} = \frac{\text{Number of Cocks Shot by Hunters Interviewed (812)}}{\text{Number of Cocks Present during Prehunt Period (X)}}$$

where X = 6,428 cocks, and

$$(2) \frac{\text{Number of Cocks Tagged during Pre-hunt Period (760)}}{\text{Number of Cocks Present during Prehunt Period (6,428)}} = \frac{\text{Number of Hens Tagged during Prehunt Period (1,040)}}{\text{Number of Hens Present during Pre-hunt Period (X)}}$$

where X = 8,796 hens.

Farmers, hunters, and project personnel recovered backtags from 372 (49.0 percent) of 760 cock pheasants captured and marked during late September, October, and early November, 1962. Hunters shot 314 (41.3 percent) of these marked cocks; 58 tags were recovered from birds which died from unknown causes.

Tags were recovered from 85 (8.2 percent) of 1,040 hens marked during the prehunt period of 1962. Hunters killed 20 (1.9 percent) of these marked hens; 65 tags were recovered from hens which died from unknown causes.

2. Manipulation of Pheasant Habitat

D. E. Newman

In 1962, 24, $\frac{1}{4}$ -mile roadside plots and 8, $\frac{1}{8}$ -mile roadside plots were seeded to a grass-legume mixture along 7 miles of roadway on the Sibley study area for the purpose of establishment top-quality habitat for nesting pheasants along roadways. The density, species composition, and height of the vegetation in the seeded plots was measured during November; the vegetative sample was comprised of 4, $\frac{1}{4}$ -meter quadrats, randomly placed, in each $\frac{1}{4}$ -mile plot. Grasses, alfalfa, and red clover averaged 8, 7, and 5 inches in height, respectively, and afforded averages of 35, 10, and 16 percent of the top cover, respectively. Grasses were present in 97 percent of 112 quadrats; alfalfa and clover had frequencies of occurrence of 73 and 69 percent, respectively.

Similar vegetative measurements made in June, 1962, resulted in frequencies of

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100

occurrence of 99, 98, and 98 percent for grasses, alfalfa, and clover, respectively. The reduced frequencies of occurrence of alfalfa and clover between June and November can be attributed to damage of seedlings by standing water, as portions of the roadside ditches were flooded during July.

3. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

A winter census of prairie chickens conducted in Clark County during January revealed an estimated population of 65 birds. Only three flocks were found in the county and one flock near Melrose contained about 50 birds.

This census was accomplished by interviewing three farmers in each area of the county where a flock of prairie chickens had been reported by high school vocational agriculture students during the fall of 1962 (Monthly Wildlife Research Letter, Vol. 5, No. 11).

4. Factors Influencing Distribution and Abundance of Pheasants

William L. Anderson

The productivity of pheasants in 1960, 1961, and 1962 on the Neoga area, south of the contiguous range occupied by pheasants in Illinois, appeared to be sufficient to maintain a permanent population, Table 1. In all 3 years, the increase in the numbers of hens from spring to fall and the ratio of juvenile hens in fall to breeding hens in the previous spring were similar to comparable data collected from within the range occupied by pheasants in Illinois and indicate that average productivity occurred on the area. The number of juveniles per adult among hens captured during the prehunt period was considerably higher than in self-maintaining populations. However, it seems more likely that these exceedingly high age ratios in the prehunt population are an indication of an unusually high rate of mortality among adult hens during late summer.

Table 1. Indices of productivity of pheasants on the Neoga study area, 1960, 1961, and 1962 (numbers of pheasants aged in parentheses).

	1960	1961	1962	All Years
Percentage increase in numbers of hens from spring to fall	91	120	111	106
Number of juvenile hens in fall per breeding hen in spring	1.7	1.7	1.6	1.7
Age ratios among hens in fall:juvenile per adult	6.7 (46)	3.2 (84)	3.2 (71)	3.7 (201)

5. Rabbit Management

William R. Edwards

Rabbits collected through mid-January evidenced normal weights and large deposits of body fat. Gonadal recrudescence was apparent in both sexes, but there was no indication of ovulation in any of the females examined.

Ages of juvenile cottontails collected in December and January were estimated by use of the aging equation (January Monthly Wildlife Research Letter). Dates of birth were computed and graphed to provide better representation of the seasonal distribution of rabbit production. Although the data were not treated statistically (pending completion of processing late-collected rabbits in January), preliminary examination of the graph does not reveal evidence of a seasonal peak of cottontail production. There is an apparent sustained level of production from March through July, fewer rabbits born in August, and very few produced later than early September.

The age distribution of cottontails in the sample from the Allerton Sanctuary revealed proportionately fewer young from summer litters than did the samples obtained on private lands near both Sibley and Neoga. The age composition of the Allerton sample was typical of many perennially low-density rabbit populations which have low juvenile to adult ratios and few young from late litters. During the coming summer, data on litter size and frequency will be obtained and compared to determine if the age structure of the Allerton rabbit population reflects a low reproduction rate, a high mortality of juveniles, or some combination of these two situations.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

February, 1963

Vol. 6, No. 2

1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

An estimate of the harvest of cock pheasants on the 37-square mile Sibley area during the 28½-day hunting season in 1962 indicated that hunters removed 72.2 percent of the available cocks. This estimate was based on the change between prehunt and posthunt sex ratios; the posthunt sex ratio was corrected for a 7.4 percent illegal kill of hens.

The prehunt sex ratio of 41.7 percent cocks was obtained from 1,821 pheasants captured by nightlighting during late September, October, and early November, 1962. The posthunt sex ratio of 17.7 percent cocks was obtained from observations of 6,931 pheasants along roadsides during late December, 1962, and January and February, 1963. The illegal kill of hens (7.4 percent) was obtained by fluoroscopic examination of 407 pheasants captured by nightlighting during January and February, 1963; 21 of 63 cocks (33.3 percent) and 12 of 344 hens (3.5 percent) contained lead shot.

2. Manipulation of Pheasant Habitat

D. E. Newman

Data collected from manipulated and control plots along 7 miles of roadway at Sibley in 1962 revealed that 50 percent of the nests established in fencerows were abandoned and/or destroyed by predators, whereas only 22 percent of the nests located in the remaining area of the roadsides had this fate (Table 1). Of the 14 nests that were abandoned and/or destroyed, nine were either indirectly or directly disrupted by large mammals, two by avian predators, two by farm machinery, and one by an unknown cause.

Table 1. Disruption of nests established in different portions of roadside areas, Sibley area, 1962. Numbers of nests are in parentheses.

	Fencerow	Remaining Area	Total
Percent of roadside area	25	75	100
Percent of nests established	55 (20)	45 (18)	100 (38)
Percent of nests disrupted	50 (10)	22 (4)	37 (14)

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3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson

It has been postulated that high air temperatures during the egg laying period has an important influence in limiting the southern distribution of pheasants. Laboratory experiments by Ralph E. Yeatter, Illinois Natural History Survey, have demonstrated that the hatchability of eggs from game farm pheasants declined to near 50 percent when exposed to preincubation temperatures between 78° and 83° for 9 hours a day during 7 consecutive days. If high temperatures inhibit hatching of pheasant eggs on the Neoga area, which is south of the contiguous range, the proportion of chicks that hatched from nests subjected to temperatures higher than 78° would be expected to be less than the proportion of chicks from nests established during periods of lower temperatures. In 1962, 50 percent of 117 young pheasants captured on the Neoga area during late summer had hatched from eggs exposed to preincubation temperatures higher than 78°. Also, the number of chicks observed in 19 broods which hatched from clutches exposed to preincubation temperatures higher than 78° averaged 8.6, whereas 23 broods from clutches not exposed to such temperatures contained an average of 7.4 chicks. These findings do not preclude the possibility that high temperatures prevent entire clutches from hatching. However, these data cast some doubt on the role of high air temperatures during the nesting season in preventing the establishment of permanent pheasant populations at Neoga.

4. Rabbit Management

W. R. Edwards, D. A. Casteel

The influence of hunting on cottontail abundance is being evaluated as part of the study on the dynamics of the rabbit population on the 4-H area of Allerton Park.

A review of the estimated numbers of rabbits on the area for the years 1956-1962 revealed a considerable annual fluctuation. Table 1 presents the data on the abundance of cottontails on the 4-H area. These data suggest that hunting might be a factor controlling rabbit abundance.

When the number of rabbits present in spring was plotted against proportionate mortality, it was found that rabbit abundance in spring was mortality dependent. There did not appear to be any strong relationship between total rabbits in the fall and the population the following spring. Apparently, mortality was not density proportionate nor was it dependent on numbers of rabbits taken by hunters. It was concluded that hunting was not the dominant factor controlling population size in spring.

There was no strong relationship between the number of rabbits on the area in spring and the number present the following fall. However, the proportionate increase from spring to fall was inversely related to the density of rabbits present in spring; the more adults, the less the percentage of young in the fall population. The females' ability to reproduce, or the survival of young, are therefore density dependent. This phenomena, referred to as "inversivity" by the late Dr. Errington, is typical of animal populations in general. It is responsible for the so-called "balance of nature." This principle of animal ecology is fundamental to the sustained harvest of game animals.

The suspected primary cause of year-to-year changes in density of cottontails was annual fluctuations in weather. No consistent relationship was evident between winter weather and mortality of cottontails. Similarly, no relationship was evident between

the number of young entering the fall population and weather during the breeding season. However, the numerical increase in rabbit numbers from spring to fall was apparently related to the amount of precipitation during the previous winter. The more rain and snow falling from December through March the fewer rabbits produced during the following breeding season. A possible explanation for this lies in the stress concept of Selye. According to this concept, previously stressed animals cannot withstand additional stresses. It is postulated that does entering the breeding season in poor physical condition as a result of stresses occurring during severe winter weather cannot withstand additional stresses imposed by successive litters. This hypothesis needs testing before data on winter weather can be used to predict trends in the fall population.

Table 1. Fluctuations in the abundance of cottontails on the 4-H study area at Allerton Park, 1956-1962.

Year	1956	1957	1958	1959	1960	1961	1962
Spring population	--	47	31	132	56	161	24
Fall population	333	259	324	239	309	363	107
Harvest	113	92	109	95	0	167	0
Decrease from fall to spring	--	686	228	192	183	148	339
Decrease due to hunting	--	113	92	109	95	0	167
Decrease due to other factors	--	173	136	83	88	148	172
Percent loss of the fall population	--	86	88	59	77	48	93
Percent loss to hunting	--	40	40	57	52	0	49
Percent loss to other factors	--	52	53	26	57	48	48
Increase from spring to fall	--	212	293	107	253	202	83
Percent increase from spring to fall	--	451	945	81	452	125	346

5. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

A census of prairie chickens in Jasper County during early February revealed three flocks which contained an estimated 141 birds. One of these flocks, located near Bogota, contained approximately 125 birds; the other flocks were found near Wakefield and West Liberty. A similar census of prairie chickens in Crawford County revealed a single flock of about 10 birds; the flock was located near Annapolis. These censuses were made by interviewing three farmers in each area of the county from which prairie chickens had been reported during the fall of 1962 by vocational agricultural students.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

March, 1963

Vol. 6, No. 3

1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

The entire carcasses of the 6 wild hen pheasants captured alive by night lighting near Sibley in January, 1963, and the intestinal tracts of 5 wild cocks shot by hunters near Sibley in December, 1962, were examined for parasites by Dr. William C. Marquardt, Department of Veterinary Pathology and Hygiene, University of Illinois. A total of 8 cestodes, 4 coccidial oocysts, and 35 cecal worms were found in these 11 pheasants. Four coccidial oocysts were found in one individual, 8 cestodes and 1 cecal worm were found in another, 34 cecal worms were distributed among 7 birds, and no internal parasites were found in 2 birds. No external parasites were found on the 6 hens.

These low levels of infestation suggest that parasitism (and coccidiosis), at present, probably is not exerting a detrimental influence on the pheasant population at Sibley.

2. Manipulation of Pheasant Habitat

D. E. Newman

The current objective of the habitat manipulation project is to investigate the feasibility of establishing grass and legume cover on roadsides to enhance and provide supplemental vegetative cover for nesting pheasants. Some preliminary guidelines regarding procedures for manipulation of habitat on roadsides, as derived from experimental work on roadsides in Ford County in 1962, are as follows:

(1) Soil nutrients, with the exception of phosphorus, and soil acidity on roadsides are within the range of tolerance for grass and legume growth. A deficiency of phosphorus is particularly evident in soils of recently reworked roadsides.

(2) A roadside devoid of vegetation can be planted more economically than a roadside with sod because of the reduced cost of seed-bed preparation.

(3) A 12-foot wide manipulation area on roadsides should be considered minimum when extensive seed-bed preparation is necessary.

(4) Roadsides consisting primarily of flat ditches and/or backslopes are preferred sites for manipulation.

(5) Roadsides consisting primarily of foreslope area are not recommended because:

(a) Foreslopes are generally too steep for practical operation of equipment;

2. Methodology

3. Results

4. Discussion

5. Conclusion

6. References

7. Appendix

8. Acknowledgements

9. Author Biographies

10. Index

(b) Soils of foreslopes contain a large amount of gravel (on gravel and black-top roads); and

(c) Foreslopes are constructed to facilitate optimum drainage of the roadway while retaining the road-bed materials on the roadway. Alteration could cause drainage and erosion problems.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson

Three hundred sixty pheasants (121 cocks and 239 hens) were released on the Neoga area during March to augment existing population levels. The released pheasants included 88 wild hens captured from established populations in southeastern Champaign County, 208 game-farm reared Korean pheasants (81 cocks and 127 hens), and 64 game-farm reared Japanese green pheasants (40 cocks and 24 hens). The age ratio among the wild hens was 1.4 juveniles per adult. All the Korean and Japanese green pheasants were juvenile birds. The sex ratio among all of the introduced birds was 2.0 hens per cock.

4. Rabbit Management

W. R. Edwards, D. A. Casteel

During late March a survey was begun to evaluate utilization of cover on land leased near Bogota to enhance production of prairie chickens, quails, and cottontails. The initial field work was done in the northwest quarter of Section 27, Smallwood Township, Jasper County. This study area (160 acres) contained an area of 40 acres in which were a 27-acre field of red clover and a 13-acre field of timothy, both unharvested in 1962. These two fields provided an excellent basis for comparison of the use of clover and timothy by cottontails.

The pellet count method was used to obtain an index to the relative use of various fields. Pellet counts were made in 917 randomly selected 2- X 2-foot quadrats in 12 fields throughout the study area. The results of these counts are presented in Table 1.

Several interesting phenomena were obvious from the preliminary evaluation. It was apparent that the study area contained a very high cottontail population, and that the focus for this population was the field of clover, receiving more than 5 times the use as did the timothy. I believe that this disparity in use resulted from differences in the density of the two cover types; the clover, being more open, allowed rabbits greater ease of movement. The portions of the timothy field most used were areas where there were openings in the cover or where the stand was much less dense.

Similar differences were apparent when utilization of clipped wheat stubble was compared with unclipped stubble. The clipped wheat stubble and annual weeds formed a dense matt that was little used by cottontails. The unclipped wheat stubble and weeds provided more open cover and had one of the higher rates of utilization. Use of winter wheat and soybean stubble was considerably higher (presumably being utilized as feeding areas) in fields adjacent to the nesting cover than in similar crop types occurring farther away.

It is apparent that, to achieve maximum densities of cottontails, extensive

areas should not be planted to timothy and small grain stubble should not be clipped.

Table 1. Utilization of cover types by cottontails as indicated by fecal pellet counts.

Cover Types	Field Acreage	Quadrats Counted	Number of Fecal Pellets	Average Pellets Per Quadrat	Estimated Pellets Per Acre
Winter wheat	16	120	99	0.825	8,984
Winter wheat	10	72	8	0.111	1,209
Winter wheat	12	82	21	0.256	2,788
Soybean stubble (heavy weeds and straw)	10	84	116	1.381	15,039
Soybean stubble (few weeds, little straw)	23	28	0	0.000	0
Soybean stubble (medium straw, few weeds)	3	47	33	0.702	7,645
Soybean stubble	10	72	24	0.333	3,626
Wheat stubble (red clover) clipped	10	58	0	0.000	0
Wheat stubble (red clover) unclipped	10	87	137	1.575	17,152
Winter fallow (plowed)	10	44	1	0.023	250
Timothy (unmowed in 1962)	13	82	130	1.585	17,261
Red clover (unmowed in 1962)	27	141	1,157	8.206	89,363
TOTAL	154	917	1,726	---	---

5. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

Twelve covies of quails were located during a census conducted in February on the 16-square mile study area located near Bogota in Jasper County. A total of 111 were counted in the 12 covies, an abundance of 1 bird per 92 acres. The number of quails per covey ranged from 3 to 19 and averaged 9.25. Much of the study area, being prairie farmland, is cultivated, and thus affords little suitable cover during winter. Consequently, quails were found only on 9 of the 16 sections censused. The abundance of quails on those sections where they were located was 1 bird per 52 acres.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

April, 1963

Vol. 6, No. 4

1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

The hatching success of pheasant nests established on the Sibley study area in 1962 was highest in pastures (29.6 percent), intermediate in hay (22.8 percent), and lowest in strip cover (15.3 percent), Table 1. However, hayfields yielded about $2\frac{1}{2}$ times as many hatched nests as all of the other cover types combined.

Abandonment of nests by hens accounted for losses of 22.1 percent of all established nests in 1962, and was the most important single factor limiting nest success. Farming operations were directly responsible for disrupting 12.8 percent of all established nests. Surprisingly, predators were not known to have directly destroyed a single nest in 1962, although they probably indirectly destroyed some of the nests listed in the category of abandoned and/or destroyed by predators.

Table 1. Percentage comparison of fate of pheasant nests established in different cover types on the Sibley study area, 1962. Data were collected from 100 randomly selected 10-acre plots comprising a 4.3 percent sample of the 23,200-acre study area. Numbers of nests are in parentheses.

Fate of Nests	Small Grains	Hay	Pasture	Strip Cover	Nonagri- cultural	Total
Hatched	19.4(6)	22.8(73)	29.6(8)	15.3(11)	25.0(5)	21.9(103)
Abandoned	19.4(6)	20.4(64)	25.9(7)	25.0(18)	45.0(9)	22.1(104)
Destroyed by farm machinery or observer†	6.5(2)	15.3(49)	3.7(1)	8.3(6)	10.0(2)	12.8(60)
Abandoned and/or destroyed by:						
a) Mammalian predators	25.8(8)	18.4(59)	7.4(2)	36.1(26)	20.0(4)	21.1(99)
b) Avian predators	0.0(0)	0.0(0)	0.0(0)	1.4(1)	0.0(0)	0.2(1)
c) Farm machinery	25.3(8)	19.1(61)	7.4(2)	4.2(3)	0.0(0)	15.7(74)
d) Livestock	0.0(0)	0.0(0)	22.2(6)	0.0(0)	0.0(0)	1.3(6)
e) Unknown causes	0.0(0)	0.9(3)	3.7(1)	4.2(3)	0.0(0)	1.5(7)
Combinations of above factors	3.2(1)	3.4(11)	0.0(0)	5.6(4)	0.0(0)	3.3(16)
Total nests established	100.1(31)	99.9(27)	99.9(27)	100.1(72)	100.0(20)	99.9(470)

† Includes nests accidentally disrupted by farmers, etc.

10. The following are the names of the persons who have been appointed as members of the committee:

[illegible]

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2. Manipulation of Pheasant Habitat

D. E. Newman

Studies of the roosting habits of pheasants on the Sibley area during winter have indicated that the birds utilize different habitats for roosting when confronted with changes in winter weather, particularly temperature. Consequently, temperatures were periodically recorded from maximum-minimum thermometers placed in 8 different microhabitats at Sibley during February and March.

The lowest mean maximum temperature occurred in tall hay, as did the lowest mean difference between maximum-minimum temperatures, Table 2. The highest mean maximum temperature occurred in a fencerow adjacent to corn stubble; the highest mean difference between maximum-minimum temperatures was also recorded at this site. The lowest mean minimum temperature was recorded from a fencerow adjacent to the tall hay. The highest mean minimum value was recorded in a plowed field.

Table 2. Temperatures (F) recorded from eight microhabitats on the Sibley area, February and March, 1963.

Microhabitat	Mean Minimum	Mean Maximum	Mean Difference Maximum-Minimum
Fencerow (corn stubble)	13.9	47.6	33.7
Fencerow (hay)	12.4	45.2	32.8
Under osage tree	12.7	43.2	30.4
Oats stubble	14.7	46.8	32.1
Tall hay	14.6	39.3	24.4
Corn stubble	13.7	44.7	31.1
Multiflora hedge	14.4	45.2	30.8
Plowing	15.3	44.9	29.6

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson

Five hundred eighty pheasants (226 cocks and 354 hens) were marked with back-tags and leg bands and released on the Neoga area during the fall and winter of 1962-63. These birds included 220 native pheasants captured and released on the Neoga area during the prehunt period of 1962; and 88 wild pheasants captured in southeastern Champaign County, all of which were released at Neoga during March, 1963. One hundred forty-one (24.3 percent) of the 580 marked pheasants were known to have died before April 30, 1963. Losses among the introduced strains exceeded those of the native birds even though the introduced pheasants were not released until March, Table 3. When all strains are considered collectively, there was no appreciable difference in mortality between the sexes.

Table 3. Deaths among the various strains of pheasants on the Neoga area between November 1, 1962, and April 30, 1963. Numbers in parentheses are percentages.

Strains of Pheasants	Date of Capture or Release	Number Released		Number Recovered	
		Cocks	Hens	Cocks	Hens
Korean	March 19, 1963	81	127	19 (23.5)	23 (18.1)
Japanese Green	March 19, 1963	40	24	6 (15.0)	5 (21.0)
Wild-Illinois	March 1, 1963	None	88	None	15 (17.0)
Native	Fall, 1962	105	115	15*(14.3)	16 (13.9)
All strains		226	354	40 (17.7)	59 (16.7)

*Excludes 42 marked native cocks that were shot during the 1963 hunting season.

4. Rabbit Management

W. R. Edwards, D. A. Casteel

Studies of cottontail reproductive behavior and the timing of ovulation and subsequent implantation of blastocysts are in progress at study pens located near Brownfield Woods in Champaign County. Data obtained in April support the hypothesis that ovulation is induced by the stimulus of copulation in the cottontail.

On April 24 and 25, a previously unmated female was observed moving along a fence following males in the adjacent pen. These males were exhibiting behavior which is typically displayed in the presence of a female in estrous. This female was introduced into a $\frac{1}{2}$ -acre pen containing two males at 5:05 PM. She hid in heavy cover until the dominant male became active at 7:00 PM. At 7:05, the buck located the doe and copulation followed almost immediately.

The female was collected for histological examination 10 hours following copulation. One ovary contained four ruptured and two mature follicles. The second ovary had 4 mature follicles. This evidence suggests that in the cottontail, ovulation occurs about 9-11 hours after copulation. This is basically the same interval as that for domestic rabbits, *Oryctolagus cuniculus*, which have been found to ovulate $10\frac{1}{2}$ hours after copulation.

This work is being undertaken in order that better criteria can be developed for determining pregnancy and reproductive status of female cottontails during the period between copulation and implantation of visible embryos.

5. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

Three hundred eleven prairie chickens were counted on 29 booming grounds on 10 census areas distributed throughout the prairie chicken range of south-central Illinois during early April, 1963, Table 4. The booming grounds were located in different types of cover in the following numbers and proportions: hay, pasture, or grass, 8 (28 percent); winter wheat or rye, 5 (17 percent); plowed ground, 4

(14 percent), soybean stubble, 3 (10 percent), winter wheat and soybean stubble, 3 (10 percent), corn stubble, 2 (7 percent), and various combinations of the above types of cover, 4 (14 percent).

Similar censuses will be conducted during subsequent years and on the same areas so that annual population changes might be detected.

Table 4. Census of prairie chickens on booming grounds on 10 sample areas in south-central illinois during the second week of April, 1963.

Census Area	County	Number of Booming Grounds	Total Number of Prairie Chickens	Prairie Chickens Per Booming Ground
1	Bond	2	18	8-10
2	Clark	5	29	1-17
3	Clay	2	25	10-15
4	Effingham	1	14	---
5	Jasper	5	89	4-36
6	Jasper	1	10	---
7	Marion	6	53	3-24
8	Perry	1	5	---
9	Wayne	2	23	9-14
10	Wayne	4	45	7-20
Totals		29	311	1-36

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

May, 1963

Vol. 6, No. 5

1. Pheasant Populations and Land Use

J. E. Warnock, G. B. Joselyn

Examination of a 2-inch band of vegetation encircling each nest bowl of 470 pheasant nests found on the Sibley area in 1962 revealed legumes to be associated with 70.6 percent of the nests, grasses with 61.6 percent of the nests, and plants other than grasses and legumes with 17.4 percent of the nests. The composition of vegetation frequently utilized by pheasants for nesting consisted of legumes only for 33.2 percent of the nests, legumes and grasses for 30.1 percent of the nests, and grasses only for 19.1 percent of the nests, Table 1.

Red clover occurred more frequently around pheasant nests at Sibley in 1962 than any other plant, Table 2. Timothy, alfalfa, sweet clover, brome grass, bluegrass, and oats were other plants frequently utilized by pheasants for nesting.

The relationship between plant availability and utilization by pheasants for nesting suggests that the seeding of legumes and grasses to improve nesting cover for pheasants is a well-founded step in habitat manipulation programs.

Table 1. Composition of vegetation proximal to 470 pheasant nests examined on the Sibley area, 1962.

Composition of Cover at Nest Site	Number of Nests	Percentage of Total Nests
1. Legume(s) Only	156	33.2
2. Grass(es) Only*	90	19.1
3. Legume(s) and Grass(es)	142	30.2
4. Other Herbaceous Plants Only	9	1.9
5. Legume(s) and Other Herbaceous Plants	15	3.2
6. Grass(es) and Other Herbaceous Plants	39	8.3
7. Legume(s), Grass(es) and Other Herbaceous Plants	19	4.0
Total	470	99.9

* Includes annual feed-grain crops, such as oats and wheat.

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Table 2. Frequency of occurrence of 37 species of plants associated with 470 pheasant nests examined on the Sibley area, 1962.

Plant Species	Number of Nests Where Plant Occurred	Plant Species	Number of Nests Where Plant Occurred
Red Clover	289	Dandelion	4
Timothy	147	Milkweed	4
Alfalfa	111	Curled Dock	3
Sweet Clover	106	Big Bluestem	3
Brome Grass	65	Wheat	2
Bluegrass	56	Corn	2
Oats	27	Horsetail	2
Canada Thistle	17	Lambs Quarters	2
Field Bind Weed	14	Prickly Lettuce	2
Foxtail Grasses	10	Wild Rose	2
Quack Grass	10	Wheat Grass	2
Orchard Grass	9	Rhubarb	1
Wild Carrot	9	Goatsbeard	1
Smartweed	9	Giant Ragweed	1
Wild Parsnip	8	Wild Mustard	1
Broadleaf Plantain	6	Wild Strawberry	1
Common Ragweed	5	Sedge	1
Horse Nettle	5	Catnip	1
		Wild Aster	1

2. Manipulation of Pheasant Habitat

D. E. Newman

Comparative measurements of vegetation on roadsides near Sibley revealed considerable differences between the composition, density, and height of vegetative species found on seeded plots and control plots. The vegetation on plots seeded in 1962 consisted predominantly of grasses, alfalfa, and clover, ranked in decreasing order of dominance. Grasses were present in 99 percent of 112, 1/4-square meter quadrats; alfalfa and clover had respective frequencies of occurrence of 80 and 69 percent, respectively. These species, grasses, alfalfa, and clover, afforded averages of 26, 10, and 7 percent top-cover in the quadrat samples. This 43 percent top-cover was more than double the cover provided by vegetation in control plots, from which top-cover averaged 21 percent. Bluegrass was the dominant cover species in control plots. The average height of the dominants in seeded plots was 8.3, 8.2, and 6.5 inches, respectively, for grass, alfalfa, and clover. Grasses in control plots averaged 6.6 inches in height. These vegetative differences are important factors to consider in the evaluation of the utilization of roadsides by nesting pheasants and in the future planning of additional habitat manipulation along roadsides.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson

Recent observations of territorial cocks and their harems on the Neoga area suggest that pheasants of the various strains are successfully cross-mating, Table 3. There was, however, a tendency for cocks and hens of each strain to occur together more frequently than with birds of other strains. The wild pheasants (native and wild-Illinois transplants) apparently associated freely with each other whereas

there was some restraint in association between the pen-reared (Korean and Japanese green) and the wild birds. Fifty-one percent of the native cocks, 46 percent of the Korean cocks, and 6 percent of the Japanese green cocks observed during April and May were accompanied by 1 or more hens, the average of which was 2.1, 1.7, and 1.0 hens, respectively. From observations of social encounters among cocks of the 3 strains, it appeared that native cocks were slightly dominant over Korean cocks, which in turn extensively dominated the Japanese green cocks. Thus, the Korean cocks were nearly as successful as the native cocks in establishing territories and maintaining harems of hens, whereas the Japanese green cocks were definitely subordinate as breeding birds.

Table 3. Association between cocks and hens of the various strains during the breeding season (April and May), Neoga. area, 1963.

Strains	Cocks Number of Observations of Cocks Accompanying Harems	Number of Harems Containing 1 or More Hens of the Following Strains			
		Native	Wild Illinois	Korean	Japanese Green
Native	40	24	22	13	1
Korean	26	8	4	21	3
Japanese Green	1	1	0	0	0

4. Rabbit Management

W. R. Edwards, D. A. Casteel

One of the studies on the rabbit project is an investigation of the extent to which damage resulting from cottontail depredations on garden crops, plants in the home landscape, nursery and forest plantings, and young fruit crops can be controlled by supplementary feeding of rabbits.

In the fall of 1962, 14 garden sites were selected and planted with 50 seedlings each of scotch pine and multiflora rose, plus 50 sprout-prunings from apple trees. Seven of the 14 sites were designated for treatment and the remainder served as controls. Treatment consisted of the establishment and maintenance of feeding stations at the seven treated sites. A commercial rabbit ration in pelleted form was provided in metal feed cans at these stations.

Weather during the latter half of December was cold and snow several inches deep covered the ground for several weeks. Rabbits utilized both treated and untreated sites heavily during this time as indicated by rabbit tracks in the snow. Rabbits located all feeders and took feed in sizable quantities. However, this study demonstrated no pronounced advantage in terms of less damage on the treated plots, Table 4.

On the basis of this initial test, it would not seem advisable to recommend establishment of feeders for control of rabbit depredations in the home landscape.

Table 4. Browse utilization of experimental plantings by cottontails during the winter of 1962-63.

	Rose		Pine		Apple	
	Damaged	Undamaged	Damaged	Undamaged	Damaged	Undamaged
Treated Plots	91	259	75	275	301	49
Control Plots	212	138	99	251	302	48

5. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

The dispersion of quails from winter coveys on the Bogota area occurred during the last week of March and the first week of April, 1963. At that time, quails dispersed from the small, isolated units of woods and brush they utilized during winter into the prairie farmland that occupies a large portion of the study area. Seventeen cock-hen pairs and 24 cock quails have been observed on the area since the dispersal of quails from the winter coveys.

Quails have been observed on territories located at distances of $\frac{1}{2}$ - 2 miles from the nearest habitat utilized by quails in winter. To better evaluate these lengthy seasonal movements, quails are being trapped and marked with backtags for individual recognition. Six cock quails were captured in "cock-hen" traps in 54 trap-days during late May.

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no. 6

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

June, 1963

Vol. 6, No. 6

1. Pheasant Populations and Land Use

J. E. Warnock

Proportionately fewer pheasant nests were established 1-90 yards than 91-220 yards from the edges of two hayfields searched on the Sibley area in June, 1963, Tables 1 and 2. A distance of 1-90 yards from the field edge comprised 85.5 percent of the area searched and contained 66.3 percent, or 114, of the 172 nests located in the two fields. However, it was reported in the Monthly Wildlife Research Letter, June, 1962, that pheasants tended to nest near the edges of hayfields.

The difference between 1962 and 1963 in the establishment of nests in relation to field edge may be because: (1) There are about 25 percent fewer acres of hay on the Sibley area this year than in 1962; and (2) there is a greater number of breeding hens this year than in 1962. Both factors would tend to cause a greater utilization of all portions of a hayfield by nesting hens and possibly eliminate a tendency to nest near the edge. Also, the available nesting cover is less dense this year than last, and, consequently, pheasants may have responded to a reduced density of vegetation by nesting farther from the field edges.

Table 1. Distribution of pheasant nests in relation to the edges in a 20-acre hayfield (440 yards x 220 yards), Sibley, 1963. Cover dominants in the field were red clover, alfalfa, and timothy.

Distance from Field Edge (Yards)	Percentage of Field Area	Pheasant Nests Found	Percentage of Total Nests Found
1 - 10	13.2	2	4.5
11 - 20	12.4	4	9.1
21 - 30	11.6	7	15.9
31 - 40	10.7	4	9.1
41 - 50	9.9	1	2.3
51 - 60	9.1	6	13.6
61 - 70	8.3	5	11.4
71 - 80	7.4	6	13.6
81 - 90	6.6	2	4.5
91 - 100	5.8	4	9.1
101 - 110	5.0	3	6.8
Total	100.0	44	99.9

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Table 2. Distribution of pheasant nests in relation to edges in a 40-acre hay-field (440 yards x 440 yards), Sibley, 1963. Cover dominants in the field were brome and alfalfa.

Distance from Field Edge (Yards)	Percentage of Field Area	Pheasant Nests Found	Percentage of Total Nests Found
1 - 10	8.9	2	1.6
11 - 20	8.5	12	9.4
21 - 30	8.1	13	10.2
31 - 40	7.6	9	7.0
41 - 50	7.2	6	4.7
51 - 60	6.8	11	8.6
61 - 70	6.4	6	4.7
71 - 80	6.0	9	7.0
81 - 90	5.6	9	7.0
91 - 100	5.2	6	4.7
101 - 110	4.8	11	8.6
111 - 120	4.3	11	3.1
121 - 130	4.0	7	5.5
131 - 140	3.5	5	3.9
141 - 150	3.1	4	3.1
151 - 160	2.7	2	1.6
161 - 170	2.3	4	3.1
171 - 180	1.9	3	2.3
181 - 190	1.4	1	0.8
191 - 200	1.0	4	3.1
201 - 210	0.6	0	0.0
211 - 220	0.2	0	0.0
Total	100.1	128	100.0

2. Manipulation of Pheasant Habitat

G. B. Joselyn

The first search for pheasant nests on manipulated and control plots along 7 miles of roadway on the Sibley area was started on May 23 and completed on June 5. Equal numbers of pheasant nests (27) were located on manipulated and control plots (Table 3). However, by June 30, 9 (33 percent) of the nests established on seeded plots had hatched compared to only 4 (14 percent) of the nests established on control plots. If active nests on both types of plots ultimately hatch, the hatching success of nests on seeded plots will be 36 percent compared to 18 percent on control plots. The second and third searchings of the plots will be conducted during the first and fourth weeks of July, respectively.

Table 3. Status of nests on manipulated and control roadside plots along 7 miles of roadway, Sibley area, June 30, 1963.

Nests	Number of Nests	
	Seeded Plots	Control Plots
Active	1	1
Hatched	9 (33)*	4 (14)*
Abandoned and/or Destroyed	17	22
Total	27	27

*Percentage of total nests that have hatched.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson and S. L. Wunderle

The population of breeding pheasants on the Neoga area in 1963 has been tentatively estimated at 320 birds (94 cocks and 226 hens). The population of hens was determined by multiplying the number of hens per cock (2.4) by the number of territorial cocks (94), previously located by a combination of visual observations and audio triangulation. The ratio of hens per cock was based on the average of the maximum number of hens observed in 28 individually located harems. As in previous years, the percentage survival of native hens from the prehunt period (October) to the following breeding season (May) appeared insufficient to insure continuation of the population, Table 4. The Korean hens survived in greater proportionate numbers than did hens of any of the other strains of game-farm reared birds released on the area in previous years. These findings, plus other limited data, suggest that Korean pheasants might contribute traits to the population that will greatly enhance the chances of developing a strain adaptable to the environmental conditions of south-central Illinois.

Table 4. Survival of pheasants from the winter of 1962-63, or from time of release, to May, 1963, Neoga study area. The number of pheasants of each strain in May was based on the ratio among different strains observed between April 16 and June 15, 1963. Percentages of survival are in parentheses.

Strains of Pheasants	Number of Pheasants in Winter, 1962-63		Number of Pheasants in May, 1963	
	Cocks	Hens	Cocks	Hens
Native	272	319	53 (19)	95 (30)
Wild-Illinois (Champaign County)	0	88		44 (50)
Korean	81	127	35 (43)	76 (60)
Japanese Green	40	24	6 (15)	7 (29)
All strains	393	558	94 (24)	222 (40)

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4. Rabbit Management

W. R. Edwards, D. A. Casteel

During the fall and winter of 1962-63, lenses of 278 rabbits from four study areas were obtained, Table 5. Most of these had been taken by hunters. Age ratios of these samples varied from 91.2 percent young-of-the-year in east-central counties to 83.2 percent in the Jasper County collection. These differences suggested possible variation in reproductive performance and survival of cottontails among the areas studied. This was supported by a statistical test which revealed a 90-percent probability that observed differences were not due to chance.

Table 5. Age ratio of cottontail populations sampled during the fall and winter of 1962-63.

Area	Juveniles	Adults	Total	Percent Juvenile
East-central counties*	83	8	91	91.2
Allerton Sanctuary	29	5	34	85.3
Neoga Area	88	11	99	88.9
Jasper County	45	9	54	83.3
Total	245	33	278	88.1

*Ford, Livingston, McLean, Iroquois

The age composition of these collections, except Jasper County, contained an above-average proportion of young-of-the-year rabbits (an earlier study based on 12,479 lenses from Illinois, Missouri, Ohio, and Wisconsin collected over a 3-year period revealed 83.2 percent juveniles in the fall population is normal for cottontails). Such high juvenile:adult ratios are generally considered to reflect good reproductive success. Recent evidence suggests that high age ratios are typical of rabbit populations which had previously experienced above-normal mortality and below-normal density. This was apparent both at Allerton and in the east-central counties last year and has previously been reported in studies of rabbit populations in Ohio.

A possible explanation for this phenomenon is that homeostatic mechanisms of population control compensate for low density and high mortality with increased reproduction and survival. Rabbit counts made on the Sibley area and at Allerton in 1962 support this hypothesis, as both areas had very low populations at the start of the breeding season.

Where populations contain more than 83 percent juveniles, the game manager should be primarily concerned with reducing natural mortality during fall and winter. Where populations consistently contain a lower segment of juveniles, the manager should consider the possibility of increasing the legal harvest as well as attempting to increase carrying capacity.

5. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis and R. J. Ellis

Fifty-four quails (51 cocks and 3 hens) were captured in cock-hen traps during

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224 trap days, marked with backtags, and released on the 16-square mile Bogota area during May and June, 1963. Also, 19 individual cocks were recaptured a total of 25 times. Twenty-one of the recaptured cocks were taken at the site of their original capture. Four of the birds were recaptured from 0.25 miles to 2.0 miles from the point of their original capture.

All quails captured were marked with a backtag constructed from Fiber Thin, a vinyl plastic material. The backtag for quails measures 2 x 1 inches, and the identification numbers and symbols on the tags have been read with the aid of binoculars at distances up to 60 yards. These backtags do not appear to have impaired the flight or physical condition of the quails.

Counts of calling cocks made on the state-managed areas in Marion and Wayne counties indicate that there are from three to four times as many quails on these areas as on the Bogota area.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

July, 1963

Vol. 6, No. 7

1. Pheasant Populations and Land Use

J. E. Warnock

The number of pheasant broods (63) observed along 320 miles of standardized roadside routes on the Sibley area during July, 1963, was 12.5 percent less than the number of broods (72) recorded for the same number of miles during July, 1962. In July of 1959, 1960, and 1961, comparable counts of 52, 82, and 83 broods were recorded, respectively. The mean age of the broods observed was 4.6 weeks in 1962, and 3.9 weeks in 1963, which tentatively suggests a slightly later hatch of chicks in 1963.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

Three searches of manipulated and control roadside plots on the Sibley study area were made for pheasant nests during the summer of 1963 (May 23-June 5, July 1-4, July 27-August 1). Nearly equal numbers of pheasant nests were established on manipulated and control plots, 45 and 43 nests, respectively (Table 1). However, hatching success on seeded plots was more than double that on control plots. Seventeen of 45 nests (37.8 percent) established on seeded plots had hatched by August 3, whereas only 7 of 43 nests (16.3 percent) of nests established on control plots had hatched by the same date. A single nest is still active on each of the two types of plots. Thus, the 15.1 acres of seeded plots have produced 1.13 hatched nests per acre compared to 0.47 hatched nests per acre on the 15.0 acres of control plots.

Table 1. Status of nests on manipulated and control roadside plots along 7 miles of roadway, Sibley area, August 3, 1963.

Pheasant Nests	Number of Nests	
	Seeded Plots	Control Plots
Active	1	1
Hatched	17	7
Abandoned and/or destroyed	27	35
Total	45	43
Hatched nests per acre	1.13	0.47

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson,
S. L. Wunderle

Forty-one pheasant nests, most of which were found in hayfields after the hay had been mowed, raked, and removed from the fields, were examined on the Neoga area during the 1963 nesting season. The origin of the hens establishing 22 of the 41 nests included 11 (50 percent) native hens, 7 (32 percent) wild, transplanted hens from Champaign County, and 4 (18 percent) game-farm reared Korean hens; 19 nests were produced by hens of undetermined origin. No Japanese green hens were observed in association with any of the nests. The average number of eggs occurring in 20 nests that were incubated was 12.2 ± 0.9 ; three successful nests contained an average of 9.3 ± 0.5 hatched eggs. Thus, hens from three of the four strains of pheasants present on the area in 1963 established nests which contained as many eggs as those of pheasants within the established range of Illinois.

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis,
R. J. Ellis

Counts of prairie chickens on the five established booming grounds on the Bogota study area in 1963 revealed that the greatest number of chickens visited the booming grounds during the last week of March and the first week of April, Table 2. The intensity of booming by cocks also appeared to be highest during this period. Hens were seen on the booming grounds from early March through mid-June, but visited the grounds most frequently on the days when booming by cocks was at a high level. Counts were made on clear mornings during the first hour after sunrise and from a distance with field glasses to prevent disturbing the birds.

Table 2. Counts of prairie chickens on booming grounds, Bogota study area, 1963.

Date	Numbers of Prairie Chickens on Booming Grounds					
	Beam	Johnson	Shackman	Refuge	Woods	All
February 19	--*	--	15	--	46	--
March 21	3	--	16	--	44	--
March 22	--	13	--	8	41	--
March 27	4	18	11	5	41	79
April 2	3	13	16	6	36	74
April 5	4	22	17	10	36	89
April 12	4	23	2	5	27	61
April 20	4	14	10	5	23	56
April 28	0	12	6**	3	21**	42
May 7	0	14	16	3	23**	56
May 13	0	13	14	2	10	39
May 27	0	12	5	0	17	34
June 3	1	7	12	0	7	27
June 10	5	3	2	0	0	10
June 17	4	3	7	0	8	22
June 24	0	0	0	0	6	6
Daily Average	2.3	11.9	9.9	3.4	24.0	37.2

* Grounds not censused; these days excluded from daily averages.

** Estimates--accurate counts not achieved because of tall vegetation.

The booming grounds had stable locations from early March through mid-April. During mid-April, the locations of two booming grounds on winter wheat were moved to adjacent areas that were being farmed for soybeans and oats. Apparently the wheat, then 10-12 inches tall, was less attractive to booming prairie chickens than recently worked cropland. Slight relocations of booming grounds were noted when the initial sites were being farmed or when other short-term disturbances occurred.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

Weights of lenses from 278 cottontails examined during the fall and winter of 1962-63 were used to investigate seasonal aspects of rabbit production in 1962. Birth dates were approximated by back dating from the time of collection. Ages were estimated using the equation:

$$\hat{X} = [68.7929 / (2.4890 - \log_{10} Y)] - 41$$

where $\hat{X}$ = age of cottontail in days

Y = weight of the lens in milligrams.

These data indicated that in 1962 cottontails were born from February until about September 20. June 10 was the approximate midpoint in the breeding season, although 50 percent of the juveniles had been born by about May 26. Generally, there was little evidence of a seasonal peak of births, Table 3. However, there was an apparent sustained level of production beginning in late February and continuing through mid-August with few rabbits born later than early September. Apparently, either production and/or survival of young was somewhat greater during the first half of the breeding season than during the latter half. Possibly, lowered production during the second half may have been due partially to losses of adults during the breeding season.

Table 3. The month of birth for 245 juvenile rabbits examined during the fall and winter of 1962-63.

	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.
Rabbits									
Number	18	24	50	41	36	40	30	5	1
Percent	7.3	9.8	20.4	16.7	14.7	16.4	12.2	2.0	0.4
Cumulative									
Percent	7.3	17.1	37.6	54.3	69.0	85.3	97.6	99.6	100.0

The concept of sustained production is in agreement with recent findings on reproductive behavior. It now appears that does typically breed within a few minutes after giving birth and are pregnant almost continuously throughout the reproductive season.

2.6 No. 8

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

T. G. Scott, Editor

Urbana, Illinois

August, 1963

Vol. 6, No. 8

1. Pheasant Populations and Land Use

J. E. Warnock

The standardized counts of pheasant broods made on the Sibley area during July and August, 1963, revealed 16.9 percent fewer broods than were recorded in 1962. The number of broods observed along 640 miles of roadside transect (2, 40-mile routes were driven weekly) was 207 broods in 1963 compared to 249 in 1962; comparable counts were 285, 235, 198, 240, and 194 broods in 1961, 1960, 1959, 1958, and 1957, respectively.

The number of adult pheasant hens observed during July and August along these same 640 miles of roadside increased from 374 hens in 1962 to 461 hens in 1963, or 23.2 percent. A total of 60.7 percent of the adult hens observed in 1963 were broodless compared to 42.8 percent in 1962.

These data suggest that the population of breeding hens was greater in 1963 than in 1962 but that the production of young pheasants, with respect to both proportionate and absolute numbers, was less in 1963 than in 1962.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

During the spring of 1962, the planting procedure on manipulated plots on roadsides near Sibley included plowing, disking, and harrowing, followed by hand seeding with a cyclone seeder. No fertilizer was applied. Success in the establishment of good stands of grasses and legumes by these planting methods has varied greatly. On the basis of criteria for measuring the establishment of stands of seeded grasses and legumes, approximately 3 of the 7 miles of manipulated roadside plots planted in 1962 could be classified as only fair to poor pheasant nesting habitat this summer (1963).

In an attempt to improve the quality of seeded plots, an additional mile-long plot (approximately 2 acres) of recently reworked roadside on the Sibley study area was seeded on August 22. As a result of soil tests and recommendations of the Ford County farm advisor, 4 tons of limestone and 60 pounds of superphosphate (P₂O₅) per acre were applied prior to plowing. Seeding was done mechanically by use of a billion seeder, which resulted in a more even distribution of seed over the ground and a more compact seed bed.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

The percentage fertility of eggs laid by pheasant hens on the Neoga area in 1961, 1962, and 1963 was based on determination of the presence or absence of embryos in 459 incubated eggs. The results of these analyses revealed that 93.9

percent (431 eggs) of the eggs examined were fertile (contained embryos) and 6.1 percent (28 eggs) were infertile (lacked embryos), Table 1. Of the 431 embryos examined 96.3 percent (415) were alive and 3.7 percent (16) were dead. Therefore, of the 459 eggs examined during the 3 years, 90.4 percent (415) could have produced chicks. These findings, similar to those that have been reported for pheasants in self-maintaining populations, tentatively suggest that the frequency of infertile eggs and dead embryos did not suppress the establishment of pheasants on the Neoga study area.

Table 1. Percentage fertility of pheasant eggs produced on the Neoga area in 1961, 1962, and 1963, as determined by the presence or absence of embryos. Numbers of eggs are in parentheses.

Year	Numbers of Eggs Examined	Percent of Eggs Containing Embryos	Percent of Eggs Lacking Embryos
1961	106	99.1 (105)	0.9 (1)
1962	181	90.6 (164)	9.4 (17)
1963	172	94.2 (162)	5.8 (10)
All years	459	93.9 (431)	6.1 (28)

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis,
R. J. Ellis

Eighty-one individual quails (74 cocks and 7 hens) were captured in cock-hen traps, marked, and released on the 16-square mile Bogota area during the spring and summer of 1963. Also, marked cocks were recaptured a total of 76 times during this same period. Three hundred ninety-eight "trap-days" were expended to capture the 157 quails, a rate of 39.4 quails per 100 trap-days.

Weights of 127 cock quails captured on the Bogota area during May, June, and July, 1963, ranged from 145 grams to 190 grams with an average of 171.1 ± 0.9 grams. Recaptured quails were not weighed if they had been weighed during the preceding 7 days. Seven hen quails ranged in weight from 185 grams to 220 grams with an average of 195.0 ± 3.4 grams.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

It has been demonstrated that age ratios varied among populations of cottontails. Seasonal aspects of rabbit production were analyzed for trends which could explain differences in age structure. The variance of cottontail ages was fairly similar for all areas. The samples with higher proportions of juveniles also had higher coefficients of variation of birth dates. Generally, this indicates that high age ratios result when young rabbits born throughout the entire reproductive season are well represented in the fall population. Conversely, a low age variance results when only a few cottontails born during a particular period survive until fall.

There was a slightly earlier average birth date for juvenile cottontails

collected in the more southerly areas than for those from farther north. A statistical test of these data failed to indicate a high probability of a significant difference, but the possibility cannot be ignored. Assuming differences did occur, what could have happened? First, it is possible that onset of breeding is partially controlled by temperature and that the warmer average temperatures prevailing in the south trigger the reproductive mechanism earlier there. Second, seasonal variation in survival may be responsible for differences in average birth dates of the surviving rabbits. Possibly, the late average birth date and lower variability in the Allerton collection (Table 2) was a result of a relatively high survival of summer litters. Similarly, the comparatively early average birth date of rabbits from Jasper County may reflect either low success of summer litters or high success of early litters.

Table 2. Age characteristics of cottontail populations sampled during the fall and winter of 1962-63.

Area	Number of Juveniles	Percent Juveniles in Sample	Average Dates of Birth of Juveniles	Coefficient of Vari- ation for Birth Date Variance (Percent)
East-central Counties	83	91.2	5/31 $\pm$ 14	42.1
Allerton Sanctuary	29	85.3	6/1 $\pm$ 19	33.5
Neoga Area	88	88.9	5/22 $\pm$ 12	41.1
Jasper County	45	83.3	5/18 $\pm$ 16	38.9
Total	245	88.1	5/26 $\pm$ 7	40.5

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson, Editor

Urbana, Illinois

September, 1963

Vol. 6, No. 9

1. Pheasant Populations and Land Use

J. E. Warnock

Studies of the nesting ecology of pheasants on the intensively cultivated Sibley area in 1963 indicated a "moderate" decline in the production of young pheasants from 1962. In 1963, as in the previous 6 years, 1957-62, nesting data were collected by searching 100 randomly selected 10-acre plots, representing a 4.3 percent sample of the 23,200-acre study area, for pheasant nests. In 1963, 453 nests were located and 81 (17.9 percent) of these hatched. These data reveal a 3.6 percent decrease from the number of nests established (470) and a 21.4 percent decrease from the number of nests hatched (103) during 1962. The decrease in number of successful nests and the 16.9 percent decrease in number of broods observed during July and August, 1963 (see Monthly Wildlife Research Letter, August, 1963), indicate that there were fewer young pheasants produced on the Sibley area during 1963 than during 1962.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

The number of successful pheasant nests per unit of area that occurred on seeded roadside plots equaled or exceeded the number which occurred in all other cover types on the Sibley study area during 1963, table 1. Roadside plots, seeded to tame grasses and legumes in 1962, produced 113 successful nests per 100 acres, the same number of hatched nests as produced per 100 acres of unharvested tame hay. Control or non-seeded, roadside plots produced 47 successful nests per 100 acres of cover. Strip cover, harvested tame hay, and pastures produced 40, 16 and 37 hatched nests per 100 acres, respectively. Small grains and non-agricultural areas each produced less than 10 hatched nests per 100 acres.

Table 1. Number of pheasant nests hatched per 100 acres of different cover types, Sibley study area, 1963.

Cover	Hatched Nests Per 100 Acres
Seeded Roadside Plots	113
Control Roadside Plots	47
Unharvested Tame Hay	113
Harvested Tame Hay	16
Strip Cover	40
Pastures	37
Small Grains	7
Non-agricultural	2

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3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

Rural mail carriers reported an average of 7.7 pheasants per 100 miles of driving in the 74 northern-most counties of Illinois in April, 1958, and 9.9 pheasants per 100 miles of driving in the 75 northern-most counties of Illinois in April, 1963. In both censuses, pheasants were most abundant in Livingston County of east-central Illinois, where 56.4 and 99.1 pheasants were observed per 100 miles of driving in April of 1958 and 1963, respectively. The 10 counties from which pheasants were most abundant in 1963 were Livingston, Ford, Iroquois, McLean, Champaign, Piatt, Woodford, Kankakee, Putnam, and Grundy, respectively; all of these counties showed increases in numbers of pheasants between 1958 and 1963. Nearly 68 percent of all pheasants reported from the 75 counties during the April, 1963, census were observed in Livingston, Ford, Iroquois, McLean, and Champaign counties. The most notable increases in abundance of pheasants between 1958 and 1963 occurred in the contiguous counties of DeWitt, Piatt, Moultrie, Macon, and Douglas, which are located south-southwest of the center of pheasant abundance in Livingston and Ford counties.

Decreases in numbers of pheasants were most significant in the northern and northwestern counties of Illinois during the past 5 years. Notable decreases in abundance occurred in Stephenson, JoDaviess, Boone, McHenry, DeKalb, Lee, Kane, and Kendall counties; less than 1 pheasant per 100 miles was reported from several of these counties in April, 1963. The abundance of pheasants in counties along the extreme southern boundary of the range of pheasants in Illinois declined or remained unchanged.

Thus, although the total abundance of pheasants in Illinois increased about 25 percent between 1958 and 1963, proportionate increases did not occur range-wide. Pheasants increased in numbers in the already top-ranked pheasant counties of east-central Illinois and in counties immediately southward, whereas pheasants decreased in most counties in northern and northwestern Illinois. Pheasants have never become established in the west-central and southern counties of Illinois. In 1963, a greater abundance of pheasants was restricted to a smaller portion of the state than in 1958.

4. Prairie Chicken and Quail

J. A. Ellis and R. J. Ellis

Nineteen quail nests, of which 10 (52 percent) hatched, were located on the 16-square mile Bogota study area during the 1963 breeding season. Of the 19 nests, 8 were found along roadsides, 5 in hayfields, 4 in idle grass fields, and 2 in fence rows. The mean number of eggs from 13 incubated clutches was 12.0. Quail chicks were hatched on the area from June 18 to September 20 with the mid-point of hatching occurring the last week of June.

Subsequent recaptures of 15 individual cock quails, originally captured and marked on the Bogota area during June and July, 1963, revealed summer movements that varied from 0.2 mile to 3.1 miles for different individual cocks; the mean movement for the 15 cocks during summer was 1.0 mile. Quail movements of this magnitude were probably a reflection of the prairie habitat that occupied most of the area.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

During March and April, 1963, a pellet census was conducted on the Bogota study area to obtain indices of cottontail abundance and use of various cover types and response to habitat manipulation on study areas approximately 160 acres in size. A total of 2,141 quadrats, each 2 x 2 feet in size, were counted in 28 different fields with 1,205 pellets found. A stratified random sampling design was used so that rabbit use could be estimated for individual fields. Estimates of cottontail use were obtained on three of the quarter-section units plus two additional fields of leased nesting cover.

The first unit censused was 157 acres of intensively cultivated, rolling prairie having no weedy or brushy cover; all 103 acres of wheat stubble on this area had been mowed. This unit contained 10 acres of wheat stubble leased for nesting cover (red clover) for quails and prairie chickens in 1963. The second unit, 159 acres, was also intensively farmed and contained little permanent cover other than two short, narrow fence rows and a small abandoned homestead. This area had a 15-acre field of weedy red clover leased for nesting cover in 1961, 1962, and 1963; however, the field had been clipped in mid-summer each year. The third unit, 154 acres, was also intensively farmed but it had a weedy fence row about a rod wide and 80 rods long. The third unit also contained a 40-acre field which included 13 acres of standing timothy and 27 acres of weedy clover leased for nesting cover in 1962 and 1963.

On the basis of the preliminary evaluation (Table 2), it appeared that weedy, unclipped stands of red clover were heavily utilized by cottontails during winter and contributed materially to the carrying capacity of the range unit. Clipped and harvested hay and pasture fields were little used by rabbits. Similarly, unclipped stubble fields were used much more extensively than were clipped stubble.

Table 2. The estimated number of rabbit pellets on three 160-acre units of the Bogota Study Area, Jasper County, Illinois, in early April, 1963.

Unit		Acreage	Estimated Number of Pellets
1	S. E. $\frac{1}{4}$, Sec. 22, Smallwood Twp.	157	42,000
2	N. E. $\frac{1}{4}$, Sec. 15, Wade Twp.	159	212,000
3	N. W. $\frac{1}{4}$, Sec. 27, Smallwood Twp.	154	3,210,000

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

October, 1963

Vol. 6, No. 10

1. Pheasant Populations and Land Use

J. E. Warnock

Studies on the 100, randomly selected, 10-acre plots on the Sibley Area in 1962 and 1963 showed some of the effects of the Federal Feed Grain Program (FFGP) on the nesting ecology of pheasants. Land that would otherwise have been in corn and soybeans (instead of small grains and hay) produced 39.8 percent (41 of 103) of all successful nests in 1962 and 30.9 percent (25 of 81) in 1963. Undoubtedly, without the high quality nesting cover, particularly unharvested hay, contributed by the program in 1962 and 1963, some of the pheasant hens that nested successfully on feed grain acres would have nested in other locations. However, it is questionable whether nesting success would have been as high as that which occurred on acres in the FFGP. In 1962, 29.9 percent (41 of 137) of the nests established on feed grain lands hatched, compared with only 18.9 percent (62 of 333) of the nests established on nonfeed grain lands; in 1963, hatching success was 25.8 percent (25 of 97 nests) on feed grain lands, compared with only 15.7 percent (56 of 356 nests) on nonfeed grain lands.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

In 1963, 17 of the 44 pheasant nests (39 percent) established on seeded roadside plots were successful, compared with 7 of the 41 nests (17 percent) established on control plots (Table 1). Abandonment and/or destruction by mammalian predators accounted for 15 nests (34 percent) on seeded plots and 16 (39 percent) on control plots. On the seeded plots, one nest was abandoned and/or destroyed by farm machinery; one was destroyed by humans and two by avian predators. These factors did not cause failure of any nests on control plots. Other causes of nest destruction being nearly equal on the two types of plots, the difference in hatching success was largely the result of a greater rate of nest abandonment on control plots than on seeded plots. Fifteen of the 41 nests (37 percent) established on control plots were abandoned, compared with only 5 of 44 nests (11 percent) established on seeded plots. Apparently, nesting habitat on seeded plots was superior to that on control plots, thus providing pheasant hens with more secure nesting sites.

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Table 1. Fate of pheasant nests established on seeded and control roadside plots along 7 miles of roadway, Sibley Study Area, 1963. Numbers of nests are in parentheses.

Fate of Nests	Percentages	
	Seeded Plots	Control Plots
Hatched	39 (17)	17 (7)
Abandoned	11 (5)	37 (15)
Abandoned and/or destroyed by		
Mammalian predators	34 (15)	39 (16)
Avian predators	5 (2)	0 (0)
Farm machinery	2 (1)	0 (0)
Humans	2 (1)	0 (0)
Unknown causes	7 (3)	7 (3)
Total	100 (44)	100 (41)

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

A count of all pheasant hens and broods observed on the Neoga Area during July and August indicated a 26 percent decline, from 1962 to 1963, in the number of hens producing broods. Twenty-five of 39 hens (64 percent) were accompanied by broods in 1962 whereas only 42 of 89 hens (47 percent) were observed with broods in 1963.

At Neoga, counts of pheasant broods along a standardized, 40-mile roadside transect, driven twice weekly during July and August, 1963, showed that 17 of 35 hens (49 percent) were accompanied by broods. Comparable data from the Sibley Area showed that 39 percent of the hens were accompanied by broods in 1963 as compared with 57 percent in 1962 (see Wildlife Research Newsletter, August, 1963).

These data suggest that the proportion of hens that hatched and reared broods decreased from 1962 to 1963 in the established pheasant range (Sibley) in Illinois, as well as south of the contiguous pheasant range (Neoga).

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis,
R. J. Ellis

A search for nests of bobwhite quails and prairie chickens was conducted on the 16-square-mile Bogota area during the period of May - August, 1963. Twelve quail nests and 10 prairie chicken nests were found on the 851 acres searched (Table 2). Seven of the 12 quail nests were found in cover along roadsides; the others were established in fields of timothy, alfalfa, or redtop. Eight of the 10 prairie chicken nests were located in redtop fields that were not harvested during 1962 or 1963. Two prairie chicken nests were found in unharvested red clover. Prairie chickens demonstrated a preference for unharvested hayfields, especially redtop. Seven quail nests and three prairie chicken nests were found on areas not systematically searched; these nests are not included in Table 2.

Table 2. Results of searches for quail and prairie chicken nests, Bogota Study Area, May - August, 1963.

	Total Acres Searched	Leased Acres Searched*	Nests Found	
			Quails	Prairie Chickens
Redtop, harvested	43.2	0	0	0
Redtop, unharvested	89.5	0	1	8
Red clover, harvested	125.0	0	0	0
Red clover, unharvested	204.9	179.9	0	2 (2)**
Timothy, harvested	30.0	0	0	0
Timothy, unharvested	45.0	13.3	2 (2)	0
Alfalfa, harvested	46.4	0	2	0
Wheat, harvested	56.0	0	0	0
Rye, harvested	12.0	12.0	0	0
Sweet clover, unharvested	28.7	28.7	0	0
Grass pasture, grazed	120.0	0	0	0
Strip cover	50.0	0	7	0
TOTALS	850.7	233.9	12	10

* All lands leased for quail and prairie chicken nesting cover were searched.

** Numbers in parentheses indicate nests found on leased lands.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

During October, a total of 241 rabbits were trapped, marked and released at their points of capture on two state-owned areas in south-central Illinois (Wayne County Lake and Forbes (Marion County) Lake). This work is preliminary to a study of cottontail ecology on intensively managed public hunting areas. During the upland game season, hunter checking stations will be operated on these areas so that population estimates, harvest rates, and hunting pressures can be determined.

Based on frequency of capture, preliminary estimates in pre-hunt populations are 850-1,250 rabbits for the Wayne Lake area, and 3,000-4,000 rabbits for the Forbes Lake area. More precise estimates will be obtained following the hunting season on the basis of marked-to-unmarked cottontails bagged by hunters.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

November, 1963

Vol. 6, No. 11

1. Pheasant Populations and Land Use

J. E. Warnock

A ratio of 3.4 young pheasants of both sexes per adult hen was found among the 1,001 pheasants captured on the Sibley Area during October and early November, 1963, whereas a ratio of 5.0 young per adult hen was found among the 1,821 pheasants captured during the same period in 1962. In 1963, age ratios within sexes were 1.7 young hens per adult hen and 9.7 young cocks per adult cock. The sample of 1,001 pheasants was comprised of 40.7 percent cocks and 59.3 percent hens. Percentages of cocks within age groups were 14.9 for adults and 49.6 for juveniles.

These data indicate a lower rate of production in 1963 than in 1962 and/or a lower rate of adult hen mortality in late summer and early fall of 1963 than during the same period in 1962. Data (see Wildlife Research Letters, August and September, 1963) on the proportion of breeding hens observed to be broodless, numbers of broods observed along standardized routes, and the proportion of established nests that were successful during 1962 and 1963 support the hypothesis of decreased production of pheasants in 1963.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

In 1963, some unfavorable public relations problems developed because of the growth of annual weeds on those roadside plots where grasses and legumes, planted to create nesting habitat for pheasant hens, had not become well established. The growth and maturation of annual weeds on some roadside plots during late July and early August caused several farmers to want their roadsides mowed on or about August 1, prior to the completion of the last search for pheasant nests in 1963.

Subsequent analysis of the data collected in 1963 revealed that none of the 37 nests, for which establishment dates were known, were initiated on either seeded or control plots after July 21, and only 1 of the 24 successful nests located on the roadside plots hatched after July 21. Therefore, it is tentatively planned that in subsequent years (pending annual changes in plant phenology), nest searches will be completed on or before July 20 so as to allow mowing of the plots before August 1.

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HISTORY SURVEY

3. Factors Influencing the Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

One hundred sixty-eight pheasants were observed during 41.5 hours of nightlighting on the Neoga Study Area, July-September, 1963; 115 (68.4 percent) of the 168 pheasants were captured. Each observation and each capture of a pheasant required 14.8 and 21.6 minutes of nightlighting, respectively.

In the late-summer period of 1962, 246 pheasants were observed, 133 of which were captured during 29.3 hours of nightlighting at Neoga; each observation and each capture of a bird required 7.1 and 13.2 minutes, respectively. Thus, the time required to observe or capture a pheasant during late summer, 1963, was almost double the time expended during the comparable period in 1962.

Of the 115 pheasants captured on the Neoga Area during the late summer of 1963, 22 (6 cocks, 16 hens) were adults and 93 (31 cocks, 42 hens, 20 too young to be sexed) were juveniles. Sex ratios among the captured birds, expressed in percentage of cocks, were 27 for adults and 44 for juveniles. Juveniles of both sexes were captured at a ratio of 5.8 young per adult hen (93 juveniles, 16 adult hens). The age ratio among captured cocks was 5.2 young per adult cock (31 juveniles, 6 adults), and among hens was 2.6 young per adult hen (42 juveniles, 16 adults). All unmarked pheasants (26 of the 115 had been previously marked) were marked with backtags and leg bands, with leg bands only, or with metal wing tags only.

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

A prehunt census of the quail populations on the Bogota Study Area and on two state public hunting areas (Wayne County and Marion County) was conducted during the first 2 weeks of November. Twenty-two coveys containing 349 birds were located on the Marion County area. Twenty coveys totaling 305 birds were observed on the Bogota Area. Seventeen coveys numbering 287 birds were flushed on the Wayne County area.

Quail densities expressed in terms of birds per 100 acres were greatest on the Wayne County area (38.8 quail per 100 acres). Quail densities were 23.2 and 3.0 birds per 100 acres on the Marion and Bogota areas, respectively.

5. Rabbit Management

Wm. R. Edwards, D. A. Casteel

Preseason trapping during early November, 1963, on the 4-H and Sanctuary Study Areas at Robert Allerton Park resulted in the tagging, color-marking, and release of 70 and 58 cottontails on the two areas, respectively. On November 23, 1963, a group of students from the University of Illinois cooperated with project personnel in the annual fall census. The purpose of this census was to obtain an estimate of the ratio of marked to unmarked rabbits flushed during a series of coordinated drives covering the study areas. During the census, workers tallied 126 rabbits on the 4-H Area, 67 of which had been color-marked; while on the Sanctuary Area 36 rabbits were seen, all but 10 of which had been color-marked.

On the basis of data obtained from trapping and from the drive censuses, population estimates were computed for the two areas, using the familiar Petersen-Lincoln index method:

$$\frac{N}{M} = \frac{n}{m}, \text{ thus } N = \frac{Mn}{m}$$

with the standard error of the estimate determined by:

$$SE = \sqrt{\frac{M^2 n (n-m)}{m^3}}$$

where N = the population size

M = the number of marked animals in the population

n = the observed sample

m = the number of marked animals in the sample.

Thus, with 95 percent confidence, the estimated numbers of rabbits at Allerton in early November, 1963, were 132 ± 22 for the 4-H Area and 80 ± 17 for the Sanctuary Area.

When data on rabbit abundance at Allerton this year are compared with findings from previous years (Table 1) it is apparent that rabbit numbers are very little different from what they were a year ago. The lack of major change in rabbit abundance from 1962 to 1963 is particularly interesting when it is noted that the Sanctuary Area had been hunted in 1962 and the 4-H Area had not.

Table 1. Summary of cottontail populations and harvest on study areas at Allerton Park, 1956 - 1963, as determined by color-marking and drive censuses.

	1956	1957	1958	1959	1960	1961	1962	1963
Sanctuary Area								
Spring			60	42	64	54	128	54
Fall		238	120	171	125	141	71	80
Harvest		*	*	*	42	*	35	*
4-H Area								
Spring		47	31	132	56	161	24	61
Fall	333	259	324	239	309	363	107	132
Harvest	113	92	109	95	*	167	*	‡

* Study area not subject to hunting.

‡ Hunting in progress, 1963-64 season.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

December, 1963

Vol. 6, No. 12

1. Pheasant Populations and Land Use

J. E. Warnock

The age ratio in a sample of 441 cock pheasants shot by hunters and examined by biologists on the Sibley Area during the 1963 hunting season was 9.2 young per adult. A ratio of 9.7 young per adult was obtained from 407 cocks captured by nightlighting prior to the hunting season. The 1963 crippling rate reported by the 468 hunters interviewed averaged 24.3 percent.

In general, the success of hunters on opening day was poorer in 1963 than in 1962: the 147 hunters interviewed on opening day in 1962 bagged a cock, on the average, every hour and 42 minutes; the rate on opening day in 1963 for 265 hunters was one cock bagged, on the average, every 2 hours and 8 minutes. Hunting conditions in 1962 and 1963 were similar in terms of weather, amount of corn harvested, and amount of fall plowing, but the number of cocks available for harvest apparently was less in 1963 than in 1962 (see Monthly Wildlife Research Letters for August, September, and November, 1963). After the opening 2 days of the season, hunting pressure appeared to be much lighter in 1963 than in 1962.

Table 1. Pheasant-harvest data obtained by interviewing hunters on the Sibley Study Area during the hunting seasons of 1956 through 1963.

Year	Number of Hunters Interviewed	Number of Cocks Aged by Bursal Examination	Age Ratio of Bagged Cocks-- Young per Adult	Gun-Hours Per Bagged Cock	Cocks Crippled and Lost per 100 Downed
1956	525	251	12.5	2.3	34.0
1957	443	290	4.7	3.5	24.4
1958	595	445	6.4	2.5	23.0
1959	461	454	5.6	2.9	17.8
1960	496	441	8.3	3.1	31.9
1961	443	402	7.0	2.8	20.9
1962	833	812	11.9	3.3	13.0
1963	468	441	9.2	3.1	24.3

2. Manipulation of Pheasant Habitat

G. B. Joselyn

Statistical analysis indicated that pheasant broods utilized seeded roadside plots to a significantly greater extent than control roadside plots during 1962; 91 percent of the 140 broods observed on the road right-of-way occurred in or opposite seeded plots. It was suggested (see Monthly Wildlife Research Letter, August, 1962) that the seeded plots may have surpassed the control plots in attraction for broods because (1) the nurse crop of oats with associated grass-legume seedlings provided denser cover than was afforded by the natural cover in control plots, and (2) the seedlings attracted large populations of insects which probably provided abundant food.

During 1963, only 68 percent of the 56 broods observed along the road right-of-way were in or opposite seeded plots; statistical tests indicated no significant difference between brood utilization of seeded and of control plots (Chi-square value = 3.81 with 2 df). The change in the vegetative dominants of the seeded plots from oats (1962) to grasses and legumes (1963) could have been responsible for the decreased brood utilization of these plots in 1963.

3. Factors Influencing the Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

It is estimated that 585 pheasant chicks were hatched on the Neoga Area during 1963. This estimate was calculated from the total number of individual broods (65) observed on the area and the average number of eggs (9) hatched per successful nest. Thus, the average number of chicks produced per hen was 2.6 in 1963, when based on a spring population of 226 adult hens. In 1962, 151 hens produced an estimated number of 865 chicks, an average of 5.7 chicks per hen. In 1963, the number of chicks produced declined 32 percent and the number of chicks per hen declined about 55 percent, as compared with 1962.

A ratio of 5.5 chicks (40 broods) per hen was observed on the Neoga Area in July and August of 1963, compared with 7.2 chicks (38 broods) per hen during the same period in 1962 (a 24 percent decline). On the Sibley Study Area, in July and August of 1962 and 1963, ratios of 5.6 chicks (110 broods) and 4.5 chicks per hen (74 broods), respectively, were observed from broods where only complete counts of chicks were obtained. These findings suggest that the number of chicks produced per hen on the Neoga Area in 1963 was comparable to that found in the established pheasant range in Illinois.

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis

One hundred thirty bobwhites were captured by nightlighting on the Bogota, Marion County, and Wayne County study areas during the fall of 1963. Twenty-nine quail were trapped at Bogota, 56 at Marion County, and 45 on the Wayne County area. The age ratio of the captured quail was 4.41 juveniles per adult, or 18.5 percent adults in the sample. Sex ratios among the captured birds favored males slightly in both age groups. There were 13 males and 11 females among the adults, and 55 males and 46 females among the juveniles. The sex of five of the juveniles could not be determined.

Mean weight of the adult quail was 194.8 grams; the mean weight of the males, 199.2 grams, was greater than the mean weight of the females, 187.8 grams. Mean weight of the juveniles was 167.1 grams; the males averaged 166.4 grams and the females 168.0 grams.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

During the study of reproductive behavior and the timing of ovulation, it was necessary to develop a satisfactory method of immobilizing cottontails so that their reproductive status could be determined without killing them. Intravenous injection of 30-50 mg/kg (about 0.5 cc for the average size cottontail) of pentobarbital sodium (Nembutal, Abbott) into the medial auricular vein of the ear proved to be a very satisfactory method of inducing surgical anesthesia in cottontails (Table 1). Loss due to shock and over-dosage was low, the recovery period was relatively short, and immobilization was rapid. Injection of pentobarbital sodium into the vein of the ear usually induced surgical anesthesia for periods of 20-40 minutes. When it is desirable to sustain anesthesia during surgery, pentobarbital sodium can be sprayed on the intestines in 0.2 cc doses as needed.

The drug was administered in 0.1 cc doses at approximately 5- to 10-second intervals. Because of the relatively small diameter of the medial auricular vein, a 27-gauge, $\frac{1}{2}$ -inch needle on a 0.5-cc syringe is recommended for administration of the Nembutal. Injecting Nembutal laterally into the auricular vein proved easier than administering it through a vertical presentation down the main trunk of the vein. The 0.5-cc syringe is suggested because less physical pressure is required to inject the drug through a 27-gauge needle used on a small syringe than when a needle of this size is used on a larger syringe. Also, the drug can be administered more accurately with a small syringe.

Cottontails do not struggle or otherwise react violently to Nembutal during induction; however, deepened respiration, accelerated heart beat, salivation, and elimination of urine occasionally occur. With experience, the researcher can feel the rabbit's response to Nembutal while he holds the animal and administers the drug, and can adjust the dosage accordingly. Satisfactory anesthesia is normally attained almost immediately and can be determined by the failure of the animal to exhibit a muscular reflex (pedal reaction) when membranes between the toes of the hind feet are pinched. Laparotomies of cottontails, anesthetized by the described procedure, were successfully and routinely performed. Several does survived two such operations at intervals of 6-10 days. During this study, intra-uterine mortality followed administration of drugs to pregnant does. It is not now known whether the intra-uterine mortality was caused by the drug's effect on the neural O_2 center or by the stresses of capture, handling, and surgery.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

January, 1964

Vol. 7, No. 1

1. Pheasant Populations and Land Use

J. E. Warnock

It was estimated that 10,391 pheasants (4,281 cocks; 6,110 hens), or an average of 281 per section, were present on the 37-square-mile Sibley Study Area just prior to the 1963 hunting season. The estimated number of pheasants on the study area immediately prior to the 1962 hunting season was 15,224 or 428 per section.

For 1963, as for 1962, the estimate was obtained by use of the following ratios:

$$(1) \quad \frac{\text{Number of Tagged Cocks Shot by Hunters Interviewed (41)}}{\text{Number of Cocks Tagged during Prehunt Period (398)}} = \frac{\text{Number of Cocks Shot by Hunters Interviewed (441)}}{\text{Number of Cocks Present during Prehunt Period (X)}}$$

where $X = 4,281$ cocks, and

$$(2) \quad \frac{\text{Number of Cocks Tagged during Prehunt Period (398)}}{\text{Number of Cocks Present during Prehunt Period (4,281)}} = \frac{\text{Number of Hens Tagged during Prehunt Period (568)}}{\text{Number of Hens Present during Prehunt Period (X')}}}$$

where $X' = 6,110$ hens.

The above estimates and information obtained about age ratios, numbers of broods, numbers of nests established, and proportions of established nests that were successful in 1962 and 1963 (see Monthly Wildlife Research Letters for August, September, and November, 1963) indicate that the production of pheasants on the Sibley Area in 1963 was 25-35 percent lower than production in 1962.

NATURAL HISTORY SURVEY

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2. Manipulation of Pheasant Habitat

G. B. Joselyn

The density of pheasant nests in seeded roadside plots during 1962 was 3.4 nests per acre in fencerows and 0.5 nest per acre in the remaining portions of the plots. In 1963, 0.5 nest per acre was established in fencerows, but there were 3.7 nests per acre in the remainder of the seeded-plot acreage. In 1962, 68.4 percent (13 of 19) of all nests located on seeded plots were established in fencerows and 31.6 percent (6 of 19) in the remainder of the plots. In 1963, only 4.5 percent (2 of 44) of the nests on seeded plots were established in fencerows, compared with 95.5 percent (42 of 44) in the remainder of the plots. Fencerow vegetation comprised only 25 percent of the total cover on the plots.

During 1962, nesting cover in all portions of the seeded plots, except about 1 yard on either side of the fencerows, consisted mainly of the nurse crop of oats which is not a "preferred" nesting cover for pheasants. The pheasants evidently concentrated their nesting in the undisturbed, fencerow portion of the seeded plots. In 1963, however, when the seeded portions of the plots provided undisturbed hayfield-type cover, nesting was concentrated in these areas rather than in fencerows.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

Forty cocks (37 bagged and 3 crippled) were shot by hunters on the Neoga Study Area during the 33½-day pheasant season (from noon, November 16, to sunset, December 19) in 1963. This kill represented 43 percent of the prehunt estimated population of 93 cocks. In 1962, the 120 cocks shot (106 bagged and 14 crippled), represented 44 percent of the estimated prehunt population of 272 cocks. Thus, the harvest of cocks in 1963 declined 67 percent from that in 1962.

Thirty-five of the 37 cocks bagged in 1963, were hatched on the area in 1963 or in previous years. One was a Korean cock and one a Japanese Green cock. The age ratio among the 26 bagged cocks examined was 12 juveniles per adult. Only 2 (1.9 percent) of the estimated prehunt population of 107 hens were shot illegally.

During 1963, 161 hunters in 61 parties expended 507 hours to bag 27 cocks, an average of 18.8 gun-hours per cock. In 1962, 353 pheasant hunters in 150 parties spent 837 gun-hours to bag 87 cocks, an average of 9.6 gun-hours per cock. In 1960 and 1961, hunters averaged 6.1 and 11.3 gun-hours per cock, respectively.

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis,
R. J. Ellis

Attempts to trap and mark prairie chickens during the fall and winter of 1962 and again during the late summer and fall of 1963 met with moderate success (Table !). Most of the roosting prairie chickens were found in legume and grass hayfields. Fields in which small-grain stubble or weed growths predominated contained no roosting prairie chickens. There was noticeable difference between the fields which had roosting prairie chickens and those which did not. Fields with no roosting prairie chickens lacked matted vegetation on the soil surface. More than 100 roosts were examined; all were formed on mats of vegetation.

Prairie chickens proved to be more susceptible to trapping during August and September than later in the year (Table 2). During late summer, prairie chickens that were flushed at night usually alighted soon after flushing. During the winter, most of the prairie chickens which were flushed at night flew out of the field. Most catches were made after the initial flush.

During the 1963 quail season, 139 hunters expended 437.5 gun-hours harvesting 175 quail (2.5 hours per bird bagged) on the Wayne County conservation area. Similar statistics for the Marion County conservation area showed that 103 hunters harvested 170 quail in 410.0 gun-hours (2.4 hours per bird bagged). On the Bogota Area, which is a 16-square mile tract of prairie farmland in Jasper County, at least 57 quail were killed by hunters in 1963; complete harvest data are not available for Bogota because hunting there is not controlled by the Illinois Department of Conservation as it is on the conservation areas. In 1963, juveniles comprised 82.7, 86.1, and 82.4 percent of the quail bagged on the Wayne County, Marion County and Jasper County (Bogota) areas, respectively. The high proportion of juveniles among the quail killed on each of these areas indicated excellent production in 1963.

Other workers have reported that differential survival sometimes occurs between the sexes of some species of animals, including the bobwhite. All of the 10 adult quail harvested at Bogota were males. Yet on the Wayne and Marion County areas, 24 of the 51 adult quail shot by hunters were males, 27 females. These data tentatively suggest that the absence of females in the hunter-bag from the Bogota Area may be a result of unusually high rates of death of breeding females, caused by the stresses of nesting and brooding in prairie-farmland habitat. On the less cultivated Wayne and Marion County areas, sufficient habitat may exist to insure the survival of adult females to the fall or early winter.

Table 1. Results of nightlighting for prairie chickens on the Bogota Study Area from September 1962 through October 1963.

Cover Type*	Number of Acres**	Number of Flushes	Acres per Flush	Number of Captures†	Flushes per Capture
Red & Ladino Clover	413.8	131	3.2	18	5.3‡
Redtop	365.2	79	4.6	24	3.3
Timothy	65.6	4	16.4	0	0.0
Wheat Stubble	66.0	0	0.0	0	0.0
Weed Stands	83.3	0	0.0	0	0.0
Lespedeza	23.0	7	3.3	1	7.0
Oat & Rye Stubble	19.5	0	0.0	0	0.0
Totals	1,036.4	221		43	
Averages			4.7		5.1

* According to dominant species.

** Each acre is counted as many times as it was nightlighted.

† No attempt was made to capture the first 35 prairie chickens flushed. All 35 were from red clover.

‡ Adjusted to exclude flushes for which no attempts at capture were made.

Table 2. Temporal effectiveness of nightlighting prairie chickens, Bogota Study Area, 1962 and 1963.

Month	Flushes	Captures	Percent Capture
August	37	11	29.7
September	39*	21	53.9
October	103	10	9.7
January	7	1	14.2
Totals	186	43	23.1

* Thirty-five additional flushes were made when no captures were attempted.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

Preseason trapping of cottontails and the operation of checking stations at the Wayne Lake and Marion Lake wildlife areas provide a basis for estimating rabbit abundance and harvest on these two state-owned public hunting areas (Table 3). It was apparent that the hunters using both areas had specialized preferences, as less than 7 percent of the 361 hunters attempted to take both rabbits and quail whereas 34 percent hunted rabbits and 59 percent hunted quail exclusively. The important consideration here is that the hunting pressure on each of the two species was considerably less than the total number of hunter trips to the area in question.

During preseason trapping, 95 and 146 cottontails were captured, ear-tagged, and released on the Wayne and Marion areas, respectively. Recovery of tags from rabbits bagged by hunters indicated that about 17 percent and 10 percent of the fall populations of cottontails were taken by hunters. Actually, these estimates of proportionate harvest are probably high for both areas, particularly the Marion Area. There is reason to suspect that disproportionately high numbers of tagged animals were killed because of problems associated with random sampling and hunter distribution.

On the basis of data on proportionate harvest obtained at the Allerton study areas, the removal of only 17 and 10 percent of the fall populations at the two state areas is considered well below optimum harvest. It is probable that at least 50 percent of the fall populations could have been taken without any serious effects on the abundance of cottontails on these two state areas in 1964. This means that the harvest of, and hunting pressure on, the rabbit populations on these areas could be increased 3-5 times.

Population estimates for the Wayne and Marion areas were 897 and 1,460, respectively; these are considered minimum estimates because of the previously mentioned problems of sampling and hunter distribution. Although the acreages of the two areas are not readily available, the density of cottontails on the Wayne Area probably exceeded 1.5 rabbits per acre; densities on the Marion Area were considerably lower because of the greater proportionate acreage of forest. The success of cottontail hunters was good, particularly at the Wayne Area. Rabbit populations on both areas appear to be in good condition and capable of withstanding considerably more hunting pressure than they received in 1963.

Table 3. Harvest and population estimates for the Wayne Lake and Marion Lake wildlife areas, 1963.

	Wayne	Marion
Total Hunter Trips	181	180
for Quail Only	127 (70%)	87 (48%)
for Rabbits Only	43 (24%)	79 (43%)
for Quail and Rabbits	11 (6%)	14 (8%)
Total Rabbit Kill	151	150
by hunters who hunted only rabbits	133 (88%)	129 (86%)
by hunters who hunted rabbits and quail	18 (12%)	21 (14%)
Rabbits Taken per Hunter Trip	2.8	1.6
Proportion of Marked Rabbits Taken	17%	10%
Estimated Prehunt Population Size	897	1,460

1000

1000

1000

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No. 2

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

February, 1964

Vol. 7, No. 2

1. Pheasant Populations and Land Use

J. E. Warnock

During the 1963 pheasant hunting season, each of 419 hunters interviewed on the Sibley Study Area, in Ford and McLean counties was asked to name his county of residence. Each of eight counties was represented by more than 4 percent of the hunters; the counties, and the percent of all hunters from each, were: Cook (14.6), Ford (14.3), Macon (8.8), Madison (6.9), McLean (6.9), Champaign (5.7), Sangamon (4.8), and Tazewell (4.3). Except for Ford County, in which 82 percent of the study area is located, there is a sizable urban area within or bordering each of these eight counties. Chicago is located in Cook County; Decatur in Macon; Alton, Collinsville, and Granite City in Madison; Bloomington in McLean; Champaign and Urbana in Champaign; Springfield in Sangamon; and East Peoria and Pekin in Tazewell County. Hunters on the Sibley Study Area came from 32 other counties, including Lake County in the northeastern corner of the state and White County in the southeastern portion of the state.

This information indicates the willingness of Illinois pheasant hunters to travel considerable distances to find good hunting.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

Vegetation on 224 randomly selected $\frac{1}{4}$ -meter quadrats, 112 located on seeded roadside plots and 112 on control roadside plots, was measured between June 25 and July 6, 1963. Seeded grasses (brome, timothy, or orchard grass) were present in 96.4 percent of the quadrats on seeded plots; seeded legumes (alfalfa or red clover) occurred in 64.4 percent of these quadrats. The 15 species of annual weeds occurring in quadrats on seeded plots were not dominant in any quadrats at the times the samples were taken.

Grasses (predominantly blue grass) were present in all quadrat samples taken on control plots. Legumes occurred in only 8.0 percent of the samples, annual weeds in 51.7 percent. Rapidly growing foxtail dominated the vegetation in some control roadside plots during late July and early August, particularly along recently reworked roadways.

Average height of vegetation on seeded plots was 19.2 inches; on control plots, 11.6 inches. Average ground area obscured by top cover was estimated to be 64.7 percent on seeded plots and 41.8 percent on control plots. The average number of stems at a height of 4 inches in quadrats on seeded plots (156.4) was lower than the average number on control plots (169.6), probably because blue grass was dominant on the latter. Duff (dead vegetative material) covered an average of 29.7 percent of the ground area in quadrats on control plots and only 4.1 percent in quadrats on seeded plots.

NATURAL HISTORY SURVEY

APR 8 1964

THE HISTORY OF THE UNITED STATES

CHAPTER I: THE FOUNDING OF THE NATION

The first part of the history of the United States is the story of the founding of the nation. This includes the early years of the colonies, the struggle for independence, and the creation of the Constitution.

The early years of the colonies were marked by a struggle for survival. The settlers had to build their own communities, defend themselves against Native Americans, and cope with the harsh weather. Despite these challenges, the colonies grew and prospered. By the mid-18th century, the colonies had become a major power in North America. The struggle for independence began in 1775, and the Continental Congress declared the colonies' independence from Great Britain. The war ended in 1781 with the British surrender at Yorktown. The new nation was born, and the Constitution was drafted in 1787.

The Constitution established the framework for the government of the United States. It created three branches of government: the executive, the legislative, and the judicial. The executive branch is headed by the President, the legislative branch by Congress, and the judicial branch by the Supreme Court.

CHAPTER II: THE GROWTH OF THE NATION

The second part of the history of the United States is the story of the growth of the nation. This includes the westward expansion, the Civil War, and the Reconstruction era. The westward expansion was a period of rapid growth and discovery. Settlers moved westward in search of new land and opportunities. The Civil War was a conflict between the North and the South over the issue of slavery. It ended in 1865 with the Union's victory. The Reconstruction era was a period of rebuilding the South and integrating African Americans into the nation.

The Reconstruction era was a period of great change and challenge. The South was rebuilt, and African Americans were granted citizenship. However, the era was also marked by violence and resistance. The Civil War had ended slavery, but the struggle for equality continued. The Reconstruction era was a period of great achievement, but it was also a period of great struggle.

The third part of the history of the United States is the story of the modern era. This includes the Progressive Era, the Great Depression, and the Second World War. The Progressive Era was a period of reform and progress. The Great Depression was a period of economic hardship. The Second World War was a global conflict that ended in 1945 with the United States' victory. The modern era is a period of great change and challenge. The United States has become a global superpower, and the world is facing new challenges.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

The adult pheasant population on the Neoga Study Area declined steadily throughout 1963. The prehunt population of 1962 was composed of 591 pheasants; 25.0 percent (53 cocks and 95 hens) were estimated to have survived to May 1963.

During March 1963, 208 game-farm Korean pheasants (81 cocks and 127 hens), 64 game-farm Japanese green pheasants (40 cocks and 24 hens), and 88 wild-Illinois hens from southeastern Champaign County were released on the area. It was estimated that the 1963 breeding population was composed of 320 pheasants (94 cocks and 226 hens): 150 native, 45 wild-Illinois, 112 Korean, and 13 Japanese green pheasants. Most of the Korean and Japanese green pheasants disappeared during the summer.

It was estimated that 585 pheasant chicks were produced on the area; 26 percent (153 chicks) were estimated to have survived until October. The 1963 prehunt population of pheasants was estimated to be 200 birds (93 cocks and 107 hens), a 37.5 percent decrease in total number of birds in the population from spring to fall. Hunters killed at least 40 cocks and 2 hens during the 33½-day, 1963 hunting season, leaving a maximum of 53 cocks and 105 hens on the area by the end of December, the smallest estimated number of birds in 4 years.

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis, R. L. Westemeier

On February 1, Ronald L. Westemeier joined the staff of the Section of Wildlife Research as research biologist. Mr. Westemeier received his Bachelor of Science degree in biological sciences from Wisconsin State College, Platteville, Wisconsin, in 1960. He expects to receive his Master of Science degree in game management from the University of Wisconsin in June of this year. His Master's thesis was concerned with land-use studies of the central Wisconsin prairie chicken range. This study was under the direction of Dr. F. N. Hamerstrom, Jr., and Professor R. A. McCabe.

The prehunt populations of quail on the Wayne County and Marion County wildlife areas in 1963 were estimated to be 716 ± 418 and 360 ± 134 quail, respectively. These estimates were based on recovery, from hunters, of quail marked on each area during the prehunt period, i.e. the Peterson-Lincoln Index (see Monthly Wildlife Research Letter, November 1963). Twenty-five of the 53 birds (47 percent) tagged on the Marion County area were killed by hunters, whereas hunters shot only 11 of the 45 (24 percent) quail tagged on the Wayne County area. Thus, the tagged quail on the Marion County area were possibly more vulnerable to hunting than those on the Wayne County area. Most of the quail trapped (by nightlighting) and marked on the Marion County area were caught in open fields on the south side of the area. This part of the area was heavily hunted during the season, and a majority of the birds harvested there were shot along the southern boundary. The distribution of marked birds on the Wayne County area was more nearly uniform, and the kill of marked birds was probably more in proportion to their numbers in the population.

Introduction

The purpose of this study is to investigate the effects of the proposed system on the performance of the system. The study is divided into two parts: a theoretical analysis and an experimental analysis.

The theoretical analysis is based on the assumption that the system is a linear system. The experimental analysis is based on the assumption that the system is a nonlinear system. The results of the theoretical analysis are compared with the results of the experimental analysis.

The results of the theoretical analysis show that the system is stable. The results of the experimental analysis show that the system is unstable. The results of the theoretical analysis are in good agreement with the results of the experimental analysis.

The results of the theoretical analysis and the experimental analysis are summarized in the following table.

Analysis	Stability
Theoretical	Stable
Experimental	Unstable

The results of the theoretical analysis and the experimental analysis are in good agreement. The results of the theoretical analysis show that the system is stable. The results of the experimental analysis show that the system is unstable.

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Some attributes of prairie-chicken nest sites were revealed through a study of 15 nests found on or near the Bogota Study Area during 1963 (Table 1). A mat of dead vegetation on the soil surface was characteristic of all nest sites examined. Also, all nests observed were in dense stands of vegetation having coverage indexes of .70 - .90. This means that 70 - 95 percent of the ground was shaded at noon.

Most nests observed were in grassy cover 5 - 12 inches tall. However, two were in redtop stubble 3 inches tall and one was in a weed patch 48 inches tall.

As noted by Yeatter (1943:391), it was observed that prairie chickens tended to locate their nests near field borders. The distance from nest to nearest field edge averaged 31.4 yards for 14 nests and ranged from 0 to 117 yards (Table 1).

Nest sites tended to be almost level. The average slope at the sites of 15 nests was 1.1 percent, and no nest was observed on a slope exceeding 3 percent (Table 1). The highest one-third of the study area contained 7 of the 15 nests studied. The lowest one-third of the area contained 3 nests; the intermediate one-third, 4 nests. One nest was located in a lowland site adjacent to the study area.

Yeatter, Ralph E.

1943. The prairie chicken in Illinois. Ill. Nat. Hist. Surv. Bull. 22(4):377-416.

Table 1. Ecology of nest of prairie chickens, located on or near the Bogota Study Area, May - August 1963.

Nest Number and Location	Cover at Nest	Cover Height (Inches)	Cover Density Index*	Distance from Field Edge (Yards)	Percent Slope
Sanctuary #1	Redtop (D) **	3	.70	0	0
Sanctuary #2	Redtop (D)	5	.70	117	2
Sanctuary #3	Redtop (D)	3	.70	40	0
Sanctuary #4	Timothy, Legume	20-40	.95	45	3
Sanctuary #5	Brome, Redtop (D)	6	.80	43	3
Sanctuary #6	Redtop, Redtop (D)	9	.90	7	0
D. Woods #1	Foxtail, Red Clover	5-8	.85	20	3
V. Fritchle #1	Timothy, Red Clover	14-40	.95	19	0
F. Kincade #1	Redtop (D), Timothy	12	.75	38	0
F. Kincade #2	Redtop (D), Timothy	12	.75	9	0
L. Beam #1	Red Clover, Weeds	12-20	.70	7	0
K. Jacobs #1	Weeds	48	.95	7	1
L. Shew #1 ***	Grass, Red Clover	14	---	Unknown	1
M. Calvert #1	Grass, Red Clover	16	.95	70	3
D. Marshall #1	Grass in Clover	12	.95	17	1
Averages				31.4	1.1

* Coverage index (Dice 1952:55).

** (D) = Dead.

*** One-half mile from the study area.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

Reproduction by female cottontails during their first summer has been reported by several workers. Sowles (1957:240-241) cited three authors who reported juvenile breeding; he also reported that 11 of 31 S. audubonii arizonae collected, which were either pregnant or lactating, were less than 9 months old. Lord (1958:273) concluded that in Illinois "juvenile breeding accounted for 26.7% of the annual cottontail crop." Negus (1959:451-452) reported that 10 of 30 juvenile females collected from the till plain region of Ohio, and 18 of 36 from the unglaciated Allegheny Plateau, were reproductively active.

During the spring and summer of 1963, an investigation of the breeding behavior of cottontails was conducted near Urbana, Illinois. In the course of this study, observations made in the field and subsequent histological examinations of ovaries revealed that two female cottontails born in early April of 1963 produced litters in late July of that year and rebred after parturition of their first litters.

Rabbit 81063A was pregnant and lactating heavily when collected for autopsy August 10, 1963. On the basis of size, the embryos were estimated to be 10-12 days old, indicating that the female had bred and ovulated about July 31, 1963. Examination of the ovaries revealed both corpora lutea and corpora albacantia. Judging from normal reproductive behavior, this female was probably bred immediately following parturition; thus, the earlier breeding must have taken place on about July 3. Lens weights (Lord 1959) indicated that this doe had been born about April 5, 1963, and was therefore approximately 90 days old when bred in early July.

Rabbit 81363A was pregnant and lactating heavily when livetrapped on July 31, 1963; she had a spontaneous abortion on August 13 and was sacrificed for histological examination on that date. Examination of ovaries revealed corpora from at least two pregnancies. Relative size of embryos indicated that the latest pregnancy was initiated about July 23. Assuming a 28-day gestation and copulation immediately after parturition, this female had bred previously on June 25. On the basis of lens weights, this earlier breeding, presumably the first for 81363A, took place when she was approximately 85 days of age.

Research is currently in progress which should provide additional information on sexual maturity and reproductive performance of cottontails during their first summer.

Lord, R. D., Jr.

1958. The importance of juvenile breeding to the annual cottontail crop. Trans. N. Am. Wildl. Conf. 23:269-275.

1959. The lens as an indicator of age in cottontail rabbits. J. Wildl. Mgmt. 23(3):258-260.

Negus, N. C.

1959. Breeding of subadult cottontails in Ohio. J. Wildl. Mgmt. 23(4):451-452.

Sowles, L. K.

1957. Reproduction in the Audubon cottontail in Arizona. J. Mammal. 38(2):234-243.

The first part of the report deals with the general situation of the country. It is a very interesting and informative study of the country's development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's development.

The second part of the report deals with the economic situation of the country. It is a very interesting and informative study of the country's economic development. The author has done a great deal of research and has gathered a wealth of material. The report is well written and is a valuable contribution to the study of the country's economic development.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

March, 1964

Vol. 7, No. 3

1. Pheasant Populations and Land Use

J. E. Warnock

Examination of a 2-inch band of vegetation encircling each nest bowl of 917 pheasant nests found on 100, 10-acre plots on the Sibley Study Area in 1962 and 1963 revealed that vegetation frequently utilized by pheasants for nesting consisted of: legumes only, 36.8 percent of the nests; grasses only, 24.8 percent of the nests; legumes and grasses, 22.4 percent of the nests (Table 1). Legumes were associated with 64.7 percent of the nests, grasses with 57.9 percent, and other herbaceous plants, primarily weeds, with 15.3 percent.

These data suggest that seeding weedy and waste areas, such as ditch banks, fencerows, unused portions of farmsteads, roadsides, and abandoned areas, to tame grasses and legumes would benefit nesting of pheasants.

Table 1. Composition of vegetation proximal to pheasant nests examined on the Sibley Study Area, 1962 and 1963.

Composition of Cover at Nest Site	Number of Nests			Percentage of Total Number of Nests		
	1962	1963	Total	1962	1963	Total
Legume(s) Only	156	184	340	33.2	40.6	36.8
Grass(es) Only*	90	139	229	19.1	30.7	24.8
Legume(s) and Grass(es)	142	65	207	30.2	14.3	22.4
Other Herbaceous Plants Only	9	10	19	1.9	2.2	2.1
Legume(s) and Other Herbaceous Plants	15	8	23	3.2	1.8	2.5
Grass(es) and Other Herbaceous Plants	39	32	71	8.3	7.1	7.7
Legume(s), Grass(es), and Other Herbaceous Plants	19	9	28	4.0	2.0	3.0
Unknown**	0	6	6	0.0	1.3	0.6
Total	470	453	923	99.9	100.0	99.9

* includes annual feed-grain crops, such as oats and wheat.

** Nest bowls not located for six nests destroyed in muddy, harvested hayfields.

NATURAL HISTORY SURVEY

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2. Manipulation of Pheasant Habitat

G. B. Joselyn

Pheasant nests were established on seeded and on control roadside plots in 1963 during the 15-week period between April 22 and August 4. The following data were obtained from 37 of 85 nests established on seeded and on control plots:

The seasonal pattern of nest establishment was similar for 21 nests on seeded and 16 nests on control plots, although a more pronounced peak of establishment occurred on the latter. Approximately 38 percent (6 of 16) of all nests established on control plots were initiated during the 2-week period of May 20-June 2; 44 percent (7 of 16) of all nests of known dates of establishment on control plots were initiated before May 20; and more than 81 percent (13 of 16 nests) had been started by June 3.

On seeded plots, high points of nest establishment occurred the weeks of May 6-19 and June 3-16; approximately 24 percent (5 of 21) of all nests on seeded plots were started during each of these weeks. On these plots, slightly over 57 percent (12 of 21) of all nests having known dates of establishment had been initiated by June 3.

The pattern of nest establishment on the study plots during 1963 differed from that of the previous year. During 1962, nest establishment on control plots reached a peak considerably earlier than on seeded plots, where tilling and seeding during April and May had disturbed the vegetation. In 1962, the peak of nest establishment on seeded plots occurred during the 2-week period of June 2-15.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

Seven hundred sixty-seven pheasants (121 cocks and 646 hens) were released on the Belmont Study Area in Wabash County on March 18 and 19, 1964. The released pheasants included 500 game-farm California hens, 131 game-farm Korean pheasants (50 cocks and 81 hens), 65 game-farm Japanese hens, and 71 wild-Iowa cocks from southwestern Iowa. All game-farm pheasants had been hatched in 1963 and the Iowa cocks had been hatched in 1963 or earlier. The sex ratio of released pheasants was 19:100 for cocks and hens, respectively.

If we assume that some offspring from all possible crosses of previously banded birds are surviving on the area, the strains of pheasants now present on the Belmont Study Area after the March 18-19 release will potentially allow 16 genetically different crosses to occur. By not releasing both sexes of the same strain at the same point, these crosses will be forced insofar as possible.

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis, R. L. Westemeier

Mortality of prairie chickens on the Bogota Study Area appeared to be high during 1963. On the basis of data in Table 2, it was calculated that the average brood lost 36 percent of its members between the ages of 3.4 and 7.5 weeks. The remains of adult prairie chickens were commonly encountered in the fields of the Bogota Study Area. Seven prairie chicken skeletons and one intact dead chicken were found during the searches for nests. The skeletons probably represent late-winter or early-spring mortality. Two other mortalities were noted in 1963; a hen killed by a mower and an adult killed by an automobile.

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Table 2. Prairie chicken broods reported from the Bogota Study Area by local cooperators.

Period of Sighting	Number of Broods	Average Number of Chicks per Brood	Estimated Average Age of Young in Weeks
June	9	8.8	3.4
July	3	8.0	7.3
August and October	2*	6.5*	7.5*
June through October	14	8.3	4.8

* Includes one brood with estimated hatching date in August.

During January and February, censuses of quail were conducted on three study areas, located respectively in Marion, Wayne, and Jasper counties, to obtain estimates of the posthunt populations. Eighteen coveys (202 quail) were found on the Marion County Wildlife Area and nine coveys (88 quail) on the Wayne County Wildlife Area; nine coveys (57 quail) were observed at Bogota in Jasper County. The posthunt populations were compared with the prehunt populations to determine the percentage of loss. The quail population at Bogota declined 81 percent from the prehunt to the posthunt period; populations on the Wayne County and Marion County wildlife areas declined 69 and 42 percent, respectively.

The posthunt populations of 57 quail, observed at Bogota in 1964, was 49 percent smaller than the population of 111 quail observed there in 1963: weather conditions during the fall months were believed to be partly responsible for this decline in population. Frequent rains during the fall of 1962 delayed the harvesting of crops; as a result, standing crops provided cover for quail during the hunting season. In addition, the late harvest that year kept many local farmers at work, thus curtailing their opportunities to hunt quail. In contrast, dry weather prevailed in 1963, and most crops on the area were harvested prior to the opening of the quail season.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

Observations of breeding behavior and autopsy of rabbits found dead along Illinois highways and of experimental animals revealed that a peak of cottontail breeding occurred during the first week of March. As a result, virtually all doe cottontails are now pregnant and will give birth to litters during the latter days of March and early April.

There are two ecological implications of this apparent synchrony of breeding and the expected peak of littering about April 1, 1964. First, farmers, sportsmen, and nature lovers should be alerted to the fact that burning of crop fields, ditch banks, and other grassy and weedy areas after March 28 will cause the deaths of thousands of nestling cottontails in Illinois this year; second, the relative survival of cottontails from the early litters will be a determining factor in the abundance of rabbits this fall.

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The American Medical Association is a non-profit corporation organized for the purpose of promoting the science and art of medicine and the health of the people. It is composed of physicians and surgeons who are interested in the advancement of their profession and the welfare of their patients. The Association is organized into various departments and committees, each of which is responsible for a specific aspect of the medical profession. The Association's primary concern is the improvement of medical education and the raising of the standards of medical practice. It also works to protect the public interest by advocating for the proper regulation of the medical profession. The Association's activities are carried out through its various departments and committees, which are supported by the contributions of its members. The Association's work is essential for the advancement of the medical profession and the health of the people.

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When better than average survival of young from these first litters occurs, we can expect a better than average peak of juvenile breeding about June 15. These juvenile females will produce young in mid-July and many of them will give birth to second litters in mid-August; a few may have third litters in September.

Because of the 28-day reproductive cycle of the cottontail, additional litters will be dropped by adult does about the first of each month from now through August. Juvenile females from second litters due in early May can be expected to produce litters in August.

There is some indication that does in counties in southern Illinois have already produced their first litters. It will be interesting to see how well these early born young survived the heavy rains and cold weather of late March.

The first part of the paper is devoted to a general discussion of the problem. It is shown that the problem is well-posed and that the solution exists and is unique. The second part of the paper is devoted to the construction of the solution. It is shown that the solution can be constructed by the method of successive approximations. The third part of the paper is devoted to the numerical solution of the problem. It is shown that the numerical solution can be obtained by the method of finite differences. The fourth part of the paper is devoted to the stability of the solution. It is shown that the solution is stable with respect to the initial conditions and the data of the problem. The fifth part of the paper is devoted to the error analysis. It is shown that the error of the numerical solution is of the order of $O(h^2)$, where h is the step size. The sixth part of the paper is devoted to the conclusion. It is shown that the problem is solved and that the solution is unique and stable.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

April 1964

Vol. 7, No. 4

1. Pheasant Populations and Land Use

J. E. Warnock

At least 50 percent of the pheasants present on the Sibley Study Area during early fall, 1963, were not present by late February, 1964. About 16 percent of the loss from the population could be attributed directly to hunting; it was estimated that 9.5 percent of the hens and 37.1 percent of the cocks were shot during the 1963 season. In view of the apparent high level of nonhunting losses occurring among birds of both sexes, provision for some type of hen harvest and a liberalization of hunting regulations for pheasants should be considered.

The above estimates of population losses are conservative, because the basic assumption was made that the only mortality suffered by adult hens, the age-class utilized to estimate losses for all other age-classes, was a result of hunting. A more realistic estimate of adult hen mortality would probably range between 20 and 30 percent for the October-February period each year; thus, the estimates of losses for the other age-classes would be proportionally higher.

Changes in composition of the Sibley pheasant population between October 1963 and February 1964, were estimated from trapped birds. Sizes of samples were 1,001 for October-November 1963, and 163 for February 1964.

Age-Class	Number per 100 Adult Hens		Percentage Loss		Total
	Prehunt	Posthunt*	Hunting	Unknown Causes	
Adult Hens	100	100	9.5	?	9.5
Juvenile Hens	171	87	9.5	39.6	49.1
Juvenile Cocks	168	31	37.4**	44.1	81.5
Adult Cocks	17	8	34.2**	18.7	52.9
All Birds	456	226	20.7	29.7	50.4

* Corrected for a 9.5 percent illegal kill of hens; the average estimated rate of illegal hen kill for 1959-62 was based on fluoroscopic examination of winter trapping samples.

** Based on number of tags recovered from cocks tagged during October and November (1963) and known to have been shot in November and December (1963).

NATURAL HISTORY SURVEY

MAY 19 1964

LIBRARY

2. Manipulation of Pheasant Habitat

G. B. Joselyn

Investigations are being conducted as to the feasibility of utilizing herbicides to control weeds on seeded roadside plots to improve the quality of the seedings for nesting pheasants and to make the plantings more acceptable to farm operators. Three age-classes of seedings currently exist on the study area: spring, 1962 seedings; spring, 1963 seedings; and fall, 1963 seedings. Weather permitting, 1.34 additional miles of roadside (approximately 2.3 acres) will be planted in the spring of 1964. The new plantings will include separate seedings of (1) a grass-legume mixture, (2) a mixture of grasses only, (3) a mixture of legumes only, and (4) alfalfa only. The first of these plantings (grass-legume mixture) is the same as was seeded in previous years. The other three plantings are being made for the first time this spring.

For the control of annual grasses, pre-emergence Radox was applied in granular form, during April, to small segments of each age-class of seeding present on the area. Postemergence 4(2,4-DB) will be applied as a spray for the control of broad-leaved weeds to segments of these plots later in the spring. These same two chemicals will be used along with Dalapon (for the control of annual grasses in the newly seeded mixture of legumes only) on certain segments of the spring, 1964 seedings after they become established.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

In April, the annual spring censuses of pheasants on the Neoga and Bellmont study areas were initiated. Work includes crowing counts, location of territorial males by audio-triangulation, and determination of harem composition. Estimates of pheasant abundance and of winter mortality will be computed from the resulting data.

Of particular interest this year is the survival and reproductive performance of 71 wild cocks obtained from southern Iowa and released on the Bellmont Study Area. Results of the spring censuses will be reported after completion of this work in late May.

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis, R. L. Westemeier

A new area has been selected for the study of quail in a prairie-farmland environment. The new area comprises 6,000 acres and is located near Alma in Marion County. This area replaces the prairie-farmland study area at Bogota in Jasper County. The change in study areas was made to make more efficient use of time and manpower, as the Alma Study Area is only 2 miles west of the Marion County Wildlife Area.

Because the two state wildlife areas will soon be dedicated, respectively, as the Sam Dale Conservation Area (Wayne County) and the Stephen A. Forbes Conservation Area (Marion County), they will be referred to as the Dale and Forbes areas in these reports.

Censuses of the prebreeding quail populations on the study areas were made during the first 2 weeks of March. Fourteen coveys containing 100 quail were observed on the Alma Study Area. Fifteen coveys having 117 quail were located on the Forbes Study Area, and eight coveys comprising 46 birds were flushed on the Dale Study Area. The prebreeding populations on the Forbes and Dale areas had declined 42 and 48 percent, respectively, from the posthunt populations of 202 and 88 birds.

The annual census of prairie chickens on booming grounds on selected areas in southern Illinois was conducted during the first 2 weeks of April, 1964 (Table 1). Three or more counts were made on each area, and the count which included the largest number of cocks was taken as the census figure. All counts were made during the first hour of daylight.

Ten of the 11 areas used for the 1964 census were also used in 1963 (see Monthly Wildlife Research Letter, April, 1963). The area added in 1964 surrounds Hunt, in Jasper County, and includes the 4-square-mile area where Dr. Ralph E. Yeatter censused prairie chickens each year from 1936 to 1963 (Yeatter 1963:745). This area was added to provide a continuation of Dr. Yeatter's data and as an eventual replacement for the West Liberty area, where prairie chickens are nearing extinction.

Six of the areas used for the censuses of 1963 and 1964 were increased in size prior to the 1964 census. In 1963, the average size of the census areas was 9.3 square miles; during 1964, the areas contained 10-16 square miles each and averaged 11.9 square miles. The smaller areas were increased to obtain more reliable data on individual flocks.

The census of 1963 revealed 311 prairie chickens (both sexes) on 10 areas. During 1964, 290 prairie chickens (254 cocks, 36 hens) were counted on 34 booming grounds on 11 census areas; only 251 chickens (216 cocks, 35 hens) were counted on the acreage used for the 1963 census. The additional chickens counted in 1964 were observed on acreage added to the 1963 census areas. Therefore, a reduction of approximately 19 percent in the number of chickens on the 1963 census areas is indicated for 1964.

If the indicated rate of reduction continues, and assuming there were less than 2,000 prairie chickens in Illinois during 1962 (see Monthly Wildlife Research Letter, November, 1962), only about 650 prairie chickens would remain by 1968. The extinction of prairie chickens in Illinois appears a distinct possibility for the near future. Therefore, strenuous efforts for their preservation are imperative in 1964.

Yeatter, Ralph E.

1963. Population responses of prairie chickens to land-use changes in Illinois. J. Wildl. Mgmt. 17(4):739-757.

Table 1. Results of censuses of prairie chickens on booming grounds on areas in southern Illinois during early April of 1963 and 1964.

Location of Area	1963	1964
Bond Co.; near Hookdale	18	19
Clark Co.; near Martinsville	29	32
Clay Co.; near Xenia	25	19
Effingham Co.; near Deterich	14	11
Jasper Co.; near Bogota	89	74
Jasper Co.; near W. Liberty	10	5
Jasper Co.; near Hunt	--*	17
Marion Co.; near Kinmundy	53	33
Perry Co.; near Swanwick	5	2
Wayne Co.; near Cisne	23	20
Wayne Co.; near Mt. Erie	45	58
Totals	311	290

* Not censused in 1963.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

Trapping of cottontails on the two Allerton Park study areas from February 25 to March 5, 1964, resulted in the color-marking of 32 rabbits on the 4-H Area and 12 on the Sanctuary Area. Dr. H. H. Shoemaker and students from the University of Illinois cooperated in the annual spring census on these areas. The purpose of the census was to obtain a population estimate based on the ratio of marked:unmarked cottontails observed on a series of coordinated drives covering the study areas. This was the seventh spring census on the Sanctuary Area and the eighth on the 4-H Area. Eight of the 39 rabbits tallied on the Sanctuary Area in the 1964 spring census had been marked during the recent trapping; and 25 of the 43 rabbits counted on the 4-H Area had recently been marked. On the basis of the data obtained from trapping and from the drive censuses, population estimates were computed for the two areas, using the Petersen-Lincoln Index:

$$\frac{N}{M} = \frac{n}{m}, \text{ thus } N = \frac{Mn}{m},$$

with the standard error of the estimate determined by

$$S_E = \sqrt{\frac{M^2 n (n-M)}{m^3}},$$

where N = the estimated population

M = the number of marked animals in the population

n = the observed sample

m = the number of marked animals in the observed sample.

Thus, the estimated numbers of cottontails on the Allerton Park study areas in the spring of 1964 were 58 ± 7 for the 4-H Area and 55 ± 17 for the Sanctuary Area.

When the abundance of cottontails on each of the two areas is compared with equivalent data from previous years (Table 2), it is apparent that rabbit numbers this spring are little different from what they were a year ago. Hunting on the 4-H Area in the fall of 1963 did not result in a major decrease in the spring population in 1964 in relation to the number of rabbits on the area the previous spring, which followed a year when the area was not hunted. Similarly, the absence of hunting on the Sanctuary Area in 1963 did not result in any apparent increase in rabbit numbers in the spring of 1964.

Table 2. Summary of cottontail abundance and harvest on study areas at Allerton Park, fall 1956 - spring 1964, as determined by color-marking and drive censuses.

	1956	1957	1958	1959	1960	1961	1962	1963	1964
Sanctuary Area									
Spring	--	--	60	42	64	54	128	54	55
Fall	--	238	120	171	125	141	71	80	--
Harvest	--	*	*	*	42	*	35	*	--
4-H Area									
Spring	--	47	31	132	56	161	24	61	58
Fall	333	259	324	239	309	363	107	132	--
Harvest	113	92	109	85	*	167	*	36	--

* Areas not hunted.

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

May, 1964

Vol. 7, No. 5

1. Pheasant Populations and Land Use

J. E. Warnock

The majority of pheasants trapped, marked, and released on the Sibley Study Area during the period September 1962 - February 1963, and subsequently observed, moved less than 2 miles from time of marking to time of subsequent observations (Table 1). Only 10.0 percent of the observations occurred more than 2 miles from the location of marking, and 77.6 percent were made 1 mile, or less, from the site of marking. Observations, either of live birds or based on returns of back tags, were made during the period September 1962 - April 1964.

Of the 2,169 pheasants marked during the fall of 1962 and the winter of 1963, 52.7 percent (1,144 different individuals) were observed one or more times after trapping, marking, and releasing.

Table 1. Movements of wild pheasants marked on the Sibley Study Area during fall trapping (September - November 1962) and winter trapping (January and February 1963) and subsequently observed September 1962 - April 1964.¹

Number of Observations for Each Category of Miles Moved

	Less Than $\frac{1}{2}$ Mile	$\frac{1}{2}$ -1	1-1 $\frac{1}{2}$	1 $\frac{1}{2}$ -2	2-2 $\frac{1}{2}$	2 $\frac{1}{2}$ -3	3-3 $\frac{1}{2}$	3 $\frac{1}{2}$ -4	4-4 $\frac{1}{2}$	4 $\frac{1}{2}$ -5	More Than 5 Miles	Total
Fall												
Trapping												
Adult ♀♀	273	70	19	12	14	5	6	2	2	1	2	406
Young ♀♀	366	178	89	75	61	32	21	10	3	2	5	842
Adult ♂♂	41	7	4	1	4	0	0	0	0	0	1	58
Young ♂♂	378	86	30	29	25	6	4	2	1	0	1	562
Winter												
Trapping												
Adult ♀♀	73	7	9	3	1	3	3	0	0	0	1	100
Young ♀♀	208	27	10	7	2	5	2	0	0	2	0	263
Adult ♂♂	17	1	1	0	0	0	0	0	0	0	0	19
Young ♂♂	77	8	0	2	0	0	0	3	0	0	1	91
Totals	1,433	384	162	129	107	51	36	17	6	5	11	2,341

¹Data are from observations of living birds positively identified in the field and from back tags obtained from hunters and farmers or found by project personnel.

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2. Manipulation of Pheasant Habitat

G. B. Joselyn

In addition to existing seeded and control roadside plots, approximately 8 miles (16 acres) of roadsides will be searched for pheasant nests during the summer of 1964. Thirty-two $\frac{1}{4}$ -mile plots were randomly selected from that portion of the Sibley Study Area which lies more than 1 mile from existing seeded and control plots. The purpose of the search is to compare pheasant production on the 32 newly established control plots with that on seeded and existing adjacent control plots.

Because the existing control plots are in close proximity to the seeded plots and both are managed to exclude mowing, these plots may not be typical of unmanaged roadside areas on the study area. By searching the additional 8 miles of control plots distant from the seeded area and by making no attempt to control the management (mowing) of these plots, we hope to obtain data regarding pheasant production on "typical" study-area roadsides.

The additional sample will include 12, $\frac{1}{4}$ -mile plots (37.5 percent) along gravel roads; 7, $\frac{1}{4}$ -mile plots (21.9 percent) along township blacktop roads; 8, $\frac{1}{4}$ -mile plots (25.0 percent) along state highways; and 5, $\frac{1}{4}$ -mile plots (15.6 percent) along dirt roads.

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

Thirty-one individual cocks were observed on 14 sections of the Bellmont Study Area during May 1964: 19 Iowa cocks, 3 Korean cocks, and 9 native cocks. Seventy-one Iowa cocks and 50 Korean cocks were released on the area during March. The native cocks were hatched and reared on the area during 1963 and were a cross between the wild cocks from the established range and California game-farm hens. The 19 Iowa cocks had an average of 1.1 hens per harem, the 9 native cocks 6.0 hens per harem, and 3 Korean cocks 1.0 hen per harem. The 31 cocks observed on the area had an average of 2.5 hens per harem.

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis, R. L. Westemeier

The number of prairie chickens in southern Illinois probably is proportional to the idle acreage of grass. There are two reasons for this conclusion: (1) during a search of 850.7 acres of potential nesting cover on the Bogota Study Area in 1963, 9 of the 11 nests found were in 134.5 idle acres of grass; (2) while censusing prairie chickens on booming grounds on 11 areas in south-central Illinois during 1964, a density of one or more booming cocks per square mile was recorded only where there were approximately 100 (or more) idle acres of grass.

Most idle fields of grass in south-central Illinois are signed under the Federal Conservation Reserve Program. A few are signed under the Federal Feed Grain Program. Idle fields of grass not federally subsidized are practically nonexistent. Unfortunately, conservation reserve contracts are expiring rapidly and no new ones are being made (Table 2). When these contracts expire, affected fields are farmed or grazed for economic reasons. Acreage idled by federal feed grain agreements varies little from year to year. However, compared with fields in the conservation reserve program, those in the feed grain program furnish poor nesting cover for prairie chickens because they are usually planted to legumes rather than the much preferred grass. Also, the cover on these fields is usually maintained for only 1 or 2 years. Consequently, the layer of dead vegetation needed by nesting prairie chickens does not accumulate.

Loss of conservation reserve acres during 1963 and 1964 will probably have an adverse effect on prairie chicken numbers in Illinois. Unless depleted nesting cover is replaced without delay, it appears certain that prairie chickens soon will become extinct in most sections of the state where they are now found.

Table 2. Federal conservation reserve contracts in six counties which support the largest numbers of prairie chickens in Illinois*.

County	Number of Effective Contracts		
	1963	1964	1965
Clark	52	11	1
Clay	125	28	1
Effingham	21	8	0
Jasper	72	18	3
Marion	64	20	6
Wayne	261	81	35
Total	595	166	46

*Based on census made in 1962 (see Monthly Wildlife Research Letter, November, 1962.)

Objectives of game management practices employed on the Dale and Forbes areas are to increase the populations of quail and to provide quality hunting. Quality hunting requires that the distribution of quail over the managed areas be relatively uniform: the habitat plantings should, as they mature, produce a pattern of distribution of quail that approaches uniformity as opposed to aggregated or random distributions. Measuring the spatial relationships among quail coveys on the areas is one way to gauge the effectiveness of management practices in creating a pattern of uniform distribution. The technique developed by Clark and Evans (1954), employing the mean distance between nearest neighbors to measure spatial relationships among populations, was used to determine the distributional patterns of quail on the areas. The coveys of quail located on the two areas during the prehunt census, conducted during the first 2 weeks of November 1963, were used as a basis for determining the patterns of distribution. The locations of coveys flushed during the census were plotted on maps, and the distance from each covey to its nearest neighboring covey was measured. These data were fitted into formulas derived by Clark and Evans (1954:447), and R values were as follows:

$$R = \frac{\bar{r}_A}{\bar{r}_E}, \quad \bar{r}_A = \frac{\sum r}{N}, \quad \bar{r}_E = \frac{1}{2p}$$

where N = the number of measurements of distance taken in the observed population or sample

r = the distance from a given individual to its nearest neighbor

p = the density of the observed distribution expressed as the number of individuals per unit of area

$\bar{r}_A$ = the mean of the series of distances to nearest neighbor

$\bar{r}_E$ = the mean distance to nearest neighbor expected in an infinitely large random distribution of density p

R = the measure of the degree to which the observed distribution departs from random expectation with respect to the distance to nearest neighbor. Values for these symbols for the Forbes and Dale areas are shown in Table 3.

In a random distribution R equals 1; under conditions of maximum aggregation, R equals 0. R values > 1 indicate distributions which tend toward uniformity. R values calculated for the Dale and Forbes areas were 0.95 and 1.36, respectively, indicating that coveys in the prehunt populations were distributed in a random pattern. The R value for the Dale Area did not depart significantly from random, but the R value for the Forbes Area showed a significant departure from random toward uniformity.

Clark, P. J., and F. C. Evans. 1954. Distance to nearest neighbor as a measure of spatial relationships in populations. *Ecology* 35(4):445-453.

Table 3. Comparison of certain statistics obtained in measuring distances to nearest neighbors among quail coveys located on the Dale and Forbes areas, November 1963.

Statistic	Dale Area	Forbes Area
Size of Area Censused (Square Miles)	1.23	2.445
N	17	22
$\bar{p}$	13.78	8.59
$\sum r$	2.17	5.11
$\bar{r}_A$	0.13	0.23
$\bar{r}_E$	0.14	0.17
R	0.95*	1.36**

*Random distribution, with no significant departure toward uniformity.

**Random distribution, with significant departure toward uniformity.

5. Rabbit Management

D. A. Casteel

Nest-building behavior of cottontail rabbits enclosed in large pens, 7-14 to a pen, was studied during the past summer in an attempt to discover behavioral means of predicting when parturition will occur. Observations revealed three fairly distinct phases of nest-building activity: excavating the cavity, lining the cavity with vegetation, and lining the cavity with hair pulled from the body.

The following report is a composite description of the nest-building activities observed:

The expectant female was quite industrious during the digging phase; she spent approximately equal time digging and alertly looking around. At times, the head and shoulders of the excavating female disappeared down the hole; movements of the ear tag suggested that she was breaking loose the hard, dry clay, by biting. Loose soil was scraped from the hole with the forefeet and chin and shoved to one side or behind; the hind feet were not used for digging. (The dimensions of 21 nests averaged 4 inches in depth, 4 3/4 inches in width, and 5 3/4 inches in length.)

The female was conspicuous as she ran back and forth with abandon from the nest site to the area where lining material was available. No green vegetation was known to have been used; old dry grass stems were apparently the preferred lining material. She gathered and carried transversely in her mouth sheaves of vegetation, the stalks extending 2 - 5 inches on each side. After depositing the material, she arranged the collected vegetation in the nest cavity with her head and forefeet. She spent considerable time on the alert as she dug her nest and did not browse during the digging; however, browsing did occur as she gathered vegetation. (It seems probable that browsing, the most common activity observed, doubles as a look-out activity. There are indications that browsing is also commonly used as an appeasement activity tending to reduce intraspecific strife.)

The final stage of nest preparation, lining the nest with hair pulled from her body, was initiated by the female rather abruptly, and signaled that parturition was imminent. Sitting 10-15 feet from her nest site, she pulled hair from her shoulders, flanks, back, legs, tail, and even feet - but not from her abdomen, as is popularly supposed. The fact that abdominal hair is white and hair found in nests is gray tends to corroborate the observation that abdominal hair is not used to line nests. Grooming of the genitals and mammae did sometimes occur during this period and resembled hair-pulling, but this was irrelevant to nest construction. The final phase was accompanied by what apparently were frequent uterine contractions which caused the female to lose locomotor control caudally. No browsing was witnessed during this phase. When the doe remained at the nest site and began to pull hair, parturition was only seconds away.

The first section of the report is devoted to a description of the work done during the year. It begins with a statement of the general character of the work, and then proceeds to a detailed account of the various projects and experiments carried out. The second section is devoted to a description of the results obtained, and the third section to a discussion of the conclusions drawn from the work.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

June, 1964

Vol. 7, No. 6

1. Pheasant Populations and Land Use

J. E. Warnock, S. L. Etter

Stanley L. Etter joined the staff on June 8 as assistant project leader. Stan received his Bachelor of Science degree in zoology from the University of Illinois in February 1961, and his Master of Science degree in zoology from Illinois in August 1963. He conducted graduate research on age determination and growth of prairie chickens.

Indications are that the production of pheasant chicks on the Sibley Study Area will be much lower in 1964 than in 1963 unless a remarkable late-season hatch occurs. The smaller acreage of hay on the area in 1964 as compared with 1963, and the poor quality of vegetative cover for nesting (a result of the dry weather), are probably directly affecting the rate of nest establishment and success. These environmental factors, in conjunction with population density, are probably indirectly affecting nesting success through sociopsychological and physiological mechanisms.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

The first search for pheasant nests on manipulated and on control plots along 7 miles of roadway on the Sibley Study Area was started on June 10 and completed on June 17. Eighty-five pheasant nests were located on the plots, 52 (3.25 nests per acre) on seeded plots and 33 (2.1 nests per acre) on control plots, compared with 85 nests (44 on seeded plots and 41 on control plots) located in three searches of the roadsides during 1963. As of June 26, 1964, four of the nests established on seeded plots had hatched, and five hens were still incubating; on the control plots, one nest had hatched and three hens were still incubating (Table 1). By June 30, 1963, nine of the nests established on seeded plots had hatched and one hen was still incubating, compared with four hatched nests and one incubating hen on control plots. In 1963 data on the nesting of pheasants on roadside plots and the corresponding 1964 data collected thus far are not strictly comparable, since the first search in 1963 was completed on June 5 whereas the first search in 1964 was completed on June 17. The second and final search of the roadside plots this summer will be conducted in mid-July.

NATURAL HISTORY SURVEY

JUL 7 1964

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Table 1. Status of nests on manipulated and on control roadside plots along 7 miles of roadway, Sibley Study Area, June 30, 1963, and June 26, 1964.

Nests	Number of Nests			
	Seeded Plots		Control Plots	
	1963	1964	1963	1964
Active	1	5	1	3
Hatched	9	4	4	1
Abandoned and/or Destroyed	17	43	22	29
Total	27	52	27	33

3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

Thirty-four pheasants (14 cocks and 20 hens) were located by a combination of visual observations and audial triangulations on the Neoga Study Area during May 1964. The pheasants located included 14 native cocks and 18 native hens hatched on the study area in 1963 or earlier, and 2 game-farm Korean hens released in March 1963. In 1963, the breeding population was composed of 94 cocks and 226 hens. Thus, there was an 89 percent decrease in breeding population from 1963 to 1964. The maximum possible posthunt (late December, 1963) population was 158 pheasants (53 cocks and 105 hens). This was a 79 percent decrease in pheasant numbers from late December, 1963, to May 1964. As in previous years, the survival of native pheasants from the posthunt period (December) to the following breeding season (May) appeared insufficient to maintain a huntable population of pheasants in south-central Illinois.

4. Responses of Bobwhites and Prairie Chickens to Habitat Manipulation

J. A. Ellis, R. J. Ellis, R. L. Westemeier

Counts of prairie chickens on booming grounds of the Bogota Study Area indicated that the population there during the spring of 1964 was equal to that found 1 year earlier (Table 2, Monthly Wildlife Research Letter, July, 1963). Elsewhere in Illinois, most populations were noticeably smaller in 1964 than in 1963 (Monthly Wildlife Research Letter, April, 1964). That prairie chicken numbers at Bogota were not similarly reduced probably was due to the Ralph E. Yeatter Prairie Chicken Sanctuary. Approximately 50 chicks were hatched on the sanctuary during 1963.

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The numbers of cocks observed on booming grounds at Bogota were high from early February through mid-April. Hens were not observed on the grounds before March 17 but were frequently seen there from March 17 until mid-April. The peak of courtship activity is not readily discernible in Table 2 but probably occurred during the first week of April.

One hundred forty-seven individual quail (132 cocks and 15 hens) were captured in cock-and-hen traps in 283 trap-days, May 19-June 19, on the Forbes, Dale, and Alma study areas (Table 3). In addition, 57 individual quail (all cocks) were recaptured 84 times. Captive, pen-reared hen quail were used to decoy the wild birds into the traps. All captured birds were marked with backtags and leg bands, weighed, and released at the trap sites.

Approximately 10 percent of the quail captured on each area were hens. Although the gregarious nature of quail probably accounted for some of the hens being attracted to the bait hens, the fact that each of the 15 hens was trapped simultaneously with 1 or more cocks suggests that the cock-hen pair-bond was responsible for the hens' vulnerability to trapping.

Table 2. Numbers of prairie chickens on booming grounds, Bogota Study Area, spring, 1964.

Date	Males	Females	Sex Unknown	Both Sexes
Feb. 5	44	0	0	44
Feb. 12	50	0	0	50
Feb. 21	55	0	0	55
Feb. 27	62	0	0	62
Mar. 5	43	0	0	43
Mar. 11	50	0	0	50
Mar. 18	52	0	9	61
Mar. 22	60	10	19	89
Mar. 29	51	7	0	58
Mar. 31	53	5	0	58
Apr. 8	55	9	0	64
Apr. 9	65	5	0	70*
Apr. 11	58	15	0	73*
Apr. 13	52	5	0	57*
Apr. 21	41	0	0	41
May 1	36	1	0	37*
May 8	36	1	0	37
May 16	35	0	0	35
May 22	28	0	0	28
May 29	24	0	0	24*

* Minimum count; vegetation too tall for accurate count.

Table 3. Quail-trapping data from the Forbes, Dale, and Alma study areas, May 19-June 19, 1964. Numbers in parentheses are hens.

	Forbes	Dale	Alma	All Areas
Quail Captured	79(8)	30(3)	38(4)	147(15)
Quail Recaptured	37	11	9	57
Total Recaptures	61	12	11	84
Total Captures*	179	43	56	278
Trap-Days (T.D.)	152	44	87	283
T. D./Orig. Capture	1.92	1.47	2.29	1.92
T. D./Total Captures	.85	1.02	1.55	1.02

* Includes "repeats"--birds taken more than once in the same trap during the same day.

Erratum

The formula on page 3 of the May 1964 Monthly Wildlife Research Letter should have read:

$$R = \frac{\bar{r}_A}{\bar{r}_E}, \bar{r}_A = \frac{\sum r}{N}, \bar{r}_E = \frac{1}{2\sqrt{p}}.$$

The square root sign was inadvertently omitted.

5. Rabbit Management

W. R. Edwards, D. A. Casteel

The study of population dynamics of cottontails on the 4-H and Sanctuary study areas, initiated in 1956 and 1957, respectively, was continued. Censuses indicated that rabbit numbers in the fall of 1963 were about the same as they were in November of 1962 and considerably lower than in the earlier years of the study. Similarly, the spring census of the two areas in March 1964 showed about the same density of cottontails as prevailed in March of the previous year. The population trends, plus the fact that the two areas have been hunted alternately in recent years, suggest that removal of up to 40 or 50 percent of the fall populations by hunting has had relatively little effect on population size.

Correlation and regression analyses were used in an attempt to evaluate the relationships among characteristics of the rabbit populations on the study areas with annual patterns of temperature and precipitation. There was relatively little synchronization in annual changes in rabbit abundance between the 4-H and Sanctuary areas. The numbers of rabbits on the areas in spring did not depend on the numbers present the previous fall, nor were they strongly related to the numbers of rabbits killed by hunters. Also, the numbers of rabbits on study areas in the fall appeared largely independent of population levels in the spring.

The role of weather as a factor responsible for annual fluctuations in rabbit abundance was not satisfactorily explained by the available data. In general, higher densities of cottontails on study areas in the spring tended to follow winters of higher precipitation and/or lower temperature. Also, the decrease in numbers of rabbits from fall to spring tended to be greater in years when the precipitation during the preceeding April-May period was above normal and/or temperatures during that period were below normal. However, fall populations tended to be higher in years following above normal precipitation and/or below normal temperature in the late spring than in years with average or below average temperature and rainfall in late spring. Thus, it may be that the high mortality from fall to spring following years with below normal temperature and/or above normal precipitation in late spring is a reflection of abundance rather than a manifestation of some direct effect of April-May weather. The data also suggested an inverse relationship between abundance of rabbits in the fall and amount of precipitation in late summer.

James A. Bailey joined the staff on June 22 as project leader. Jim, a native of Chicago, received his B. S. degree in June 1956 from Michigan College of Mining and Technology, and his M. S. degree in June 1958 from New York State College of Forestry. He attended the University of Michigan in 1958-59 and the New York State College of Forestry again from 1962 to June 1964, where he expects to receive the Ph.D. degree after completion of his thesis. Jim's Ph.D. research was on the crude protein content of deer browse in the Adirondacks.

Mrs. Dodds
Unit
v. 7 no. 7

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson, Editor

Urbana, Illinois

July, 1964

Vol. 7, No. 7

1. Pheasant Populations and Land Use

J. E. Warnock, S. L. Etter

The 28 pheasant broods observed along 320 miles of standardized roadside routes on the Sibley area during July 1964 were 56 percent less than the 63 broods recorded for the same number of miles during July 1963, and 61 percent less than the 72 broods recorded during July 1962. In July of 1959, 1960, and 1961, comparable counts of 52, 82, and 83 broods were recorded, respectively.

This information, plus the fact that to date only 209 nests, including 19 successful nests, have been located by searches conducted of the northwest 10 acres of 100, 40-acre randomly selected plots, indicates a very low rate of pheasant reproduction on the Sibley Study Area during 1964.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

The second and final search was made for pheasant nests on manipulated and on control roadside plots along 8 miles of roadway on the Sibley Study Area from July 22 to 27; the first search took place June 10 to 17. A total of 106 pheasant nests were located on the plots during the two searches, 68(4.3 nests per acre) on seeded plots and 38(2.4 nests per acre) on control plots. During 1963, 44 nests (2.9 per acre) were located on seeded plots and 41 nests (2.7 per acre) on control plots. Thus, nest densities on seeded plots increased by 1.4 per acre compared to a decrease of 0.3 nest per acre on control plots. In 1963, 17 nests hatched on seeded plots, compared to 7 nests on control plots. As of July 30, 1964, 10 nests had hatched on seeded plots with 5 hens still incubating; 4 nests had hatched on control plots with 1 hen still incubating (Table 1).

Table 1. Status of pheasant nests on manipulated and on control roadside plots along 8 miles of roadway, Sibley Study Area, at the conclusion of the 1963 nesting season and on July 30, 1964.

Nests	Number of Nests			
	Seeded Plots		Control Plots	
	1963	1964	1963	1964
Active	--	5	--	1
Hatched	17	10	7	4
Abandoned, destroyed, or both	27	53	34	33

NATURAL HISTORY SURVEY

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3. Factors Influencing Distribution and Abundance of Pheasants

W. L. Anderson, S. L. Wunderle

During June 1964, attempts were made to locate pheasant nests on the Neoga and Bellmont areas by interviewing farmers and searching hayfields after the hay had been mowed, raked, and removed from the fields. At Bellmont, 13 nests were found of which 5 had been incubated and 6 had not been incubated; the stage of development of the other 2 nests was undetermined. The five incubated nests contained an average of 10.8 ± 2.3 eggs. Four of the incubated nests had hatched, each producing an average of 9.0 ± 2.0 chicks. At Neoga, no nests were found by searching 104 acres of hay.

4. Responses of Bobwhites to Habitat Manipulation

J. A. Ellis, R. L. Westemeier

Counts of calling quail were made on the Dale and Alma areas from the first of May until mid-July by driving standardized routes, stopping at pre-determined sites, and counting the individual cock and hen quail that called and the "bobwhite" calls during a 2-minute period. Road construction prevented comparable counts on the Forbes area.

Whistling activity among cock quail on the Alma and Dale areas increased greatly about May 15. After May 15, whistling activity continued on both areas at an accelerated rate, with but minor weekly variations, until the end of June. The average number of cock quail heard to call at each of 12 stops on the Dale area ranged from 4.9 to 6.6 during the period of accelerated whistling activity. On the Alma area, the average number of cocks heard per stop at each of 10 stops ranged from 2.5 to 4.2.

During this period of increased vocal activity, cocks on the two areas were more vulnerable to capture in the cock-and-hen traps. It is suspected that most of the hens were incubating during this period.

5. Responses of Prairie Chickens to Habitat Manipulation

R. J. Ellis

It has been reasonably well established that the most critical need of the waning populations of prairie chickens in Illinois is suitable nesting cover (Yeatter 1963:745, 749). In order to better understand the relationships between the acreage of nesting cover and prairie chicken numbers, cover on the areas chosen for annual counts of cocks on booming grounds was mapped during April and early May 1964. The mapping provided information on land-use during the nesting period for prairie chickens in 1963.

Idle fields of grass and grass meadows were the only cover types found which, according to the nest study of 1963 (Monthly Wildlife Research Letter, October, 1963) and Yeatter (1963:750-751), are considered to be productive nesting cover. These cover types are the only ones not usually disturbed during the main part of the nesting season.

There was not a strong correlation between the numbers of cocks on booming grounds in 1964 and the acreages of grasslands undisturbed during the 1963 nesting season (Fig. 1). However, I believe that if the acreage of "good" nesting cover, rather than grasslands, undisturbed during the nesting season had been measured, the correlation would have been stronger. Many acres of grasslands represented in Fig. 1 did not support good nesting cover. For example, several idle fields of grass on the Xenia area were on low sites and were more or less surrounded by large trees. Such fields are not favored habitat for prairie chickens in southern Illinois (Yeatter 1963:752). Conversely, nearly all of the grasslands located at Bogota were on open elevated sites favored by prairie chickens. Probably this is why the Bogota area produced more prairie chickens than the Xenia area. Thus, refuges should be located on elevated open sites.

Yeatter, Ralph E. 1963. Population responses of prairie chickens to land-use changes in Illinois. J. Wildl. Mgmt. 27(4):739-757.

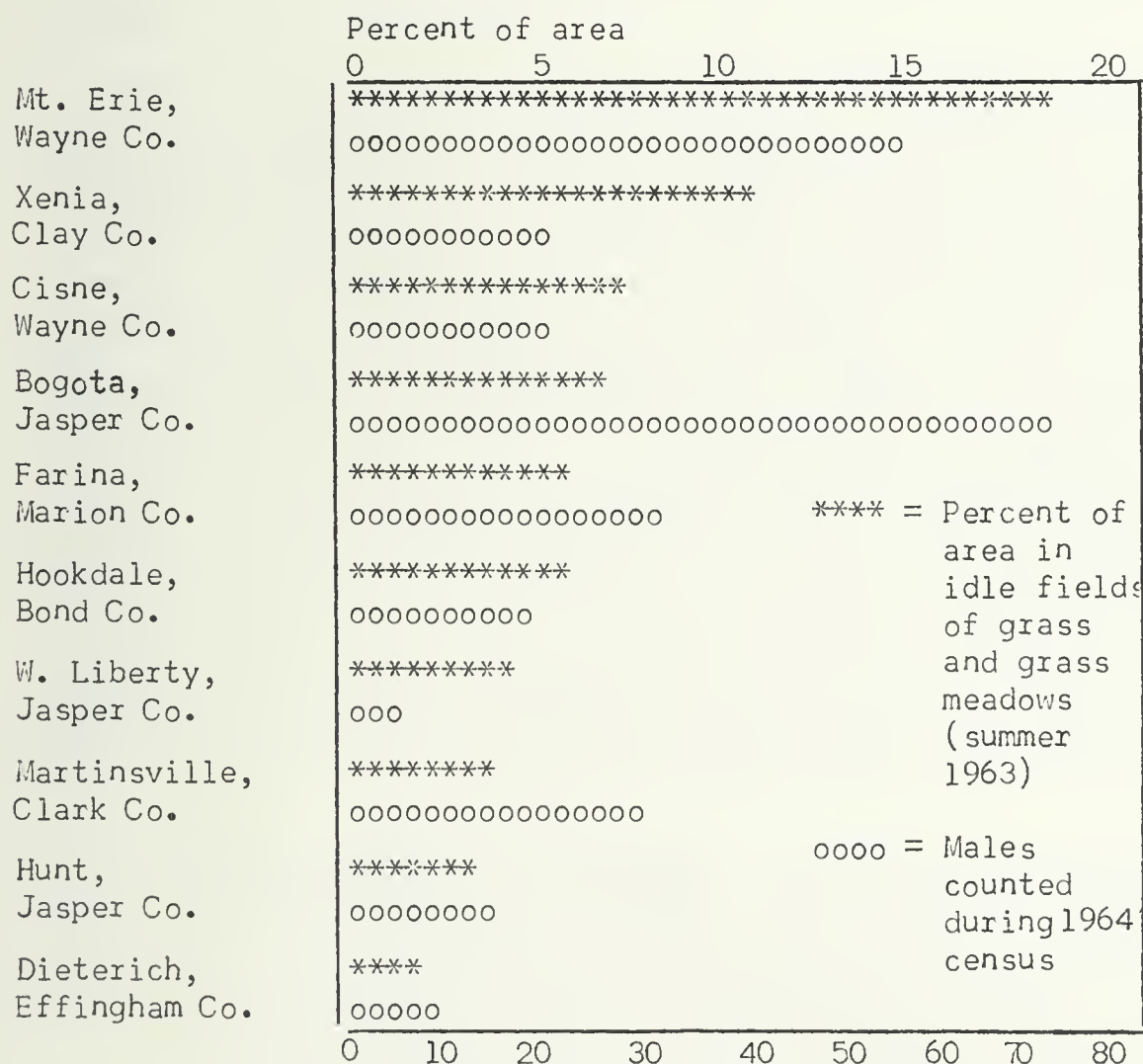


Figure 1 -- Relationship of the number of male prairie chickens counted on booming grounds during 1964 and percent of area in grass meadows and idle fields of grass during the summer of 1963.

6. Rabbit Management

J. A. Bailey, D. A. Casteel

Reproductive Behavior. -- A study of cottontail reproductive behavior has revealed that a dominant male will begin to associate with a pregnant female almost constantly as parturition approaches. At the onset of most evening periods of activity, the dominant male, and often other males, in a rabbit enclosure systematically checked the females by olfaction. The dominant male began to associate with pregnant females as early as 3 days prior to parturition. This behavior was characterized by an aggressive maintenance of as close a proximity to the female as possible and a defense of that vicinity against subordinate males. The female seemed to determine how near she could be approached and defended the vicinity by attacking all intruders and chasing them to the rather sharply defined boundary of her territory. This contrasted to the male's defense of the area immediately surrounding the female; he was apt to chase an intruder of this area around the entire pen one or more times before returning to some point near her to resume his vigil. As the time of parturition drew nearer the size of the area defended by the female decreased, and the social hierarchy between males became more evident as competition became keener.

Marsden and Conaway (1963:167) state that the path the female takes after parturition can be deduced by observing the males following along the trail evidently by olfaction. Apparently the estrous status of females is checked daily by males and when a female is found to be receptive, or receptivity is probable, the male attends her until either copulation is allowed or the receptivity wanes. This would help to ensure that a male was in attendance at the optimum time for breeding. Without the aforesaid knowledge, one might think that it would be improbable that a male would usually be in the vicinity of a newly postparturient female. It is not known how long after giving birth the female remains receptive. Holler (Marsden and Holler 1964:17) states that estrus in the Swamp Rabbit, S. aquaticus, lasts less than 1 hour. I suspect that the cottontail also is receptive for a short time only and that a female would not stray far from the nest searching for a mate. This suggests that among cottontails in the wild there is generally a male in attendance at the time of parturition and that he immediately services the postparturient female. This further suggests and augments Conaway's (Conaway et al. 1963) contention that commencing with the onset of the reproductive season in late winter, all females of breeding condition are continuously pregnant until cessation of the breeding season in late summer.

Population Dynamics at Allerton. -- Differential mortality of marked and unmarked rabbits due to hunting, as found in Michigan by Eberhardt et al. (1963), is not strongly indicated on the Allerton 4H Area (Table 2). The proportion of marked animals in the kill decreased as the season progressed only in 1961-62 when an unusually large harvest was made. If marked rabbits are especially susceptible to hunting, the trend of 1961-62 should have occurred in at least some of the other years, but it did not. This leaves the very intriguing possibility that immigration of unmarked rabbits onto the 4H Area was especially high in 1961-62 as a result of the very large kill of rabbits during the first 20 days of that season.

Conaway, C. H., H. M. Wight, and K. C. Sadler. 1963. Annual production by a cottontail population. J. Wildl. Mgmt. 27(2):171-174.

Eberhardt, L., T. J. Peterle, and R. Schofield. 1963. Problems in a rabbit population study. Wildl. Monograph No. 10.

Marsden, H. M., and C. H. Conaway. 1963. Behavior and the reproductive cycle in the cottontail. J. Wildl. Mgmt. 27(2):161-170.

Marsden, H. M., and N. Holler. 1964. Social behavior in confined populations of the cottontail and the swamp rabbit. Wildl. Monograph No. 13.

Table 2. Cumulative proportion of marked rabbits in the kill on the Allerton 4H Area.*

Period		1956-57	1957-58	1958-59	1959-60	1961-62
Nov. 20-30	Total kill to date	26	49	53	43	87
	% marked	19	22	34	19	39
Dec. 1-10	Total kill to date	65	71	57	48	128
	% marked	20	27	33	21	35
Dec. 11-20	Total kill to date	74	77	69	53	137
	% marked	20	27	36	19	35
Dec. 21-31	Total kill to date	79	80	72	56	148
	% marked	23	27	38	18	34
Jan. 1-10	Total kill to date	80	85	86	63	161
	% marked	22	26	36	17	33
Jan. 10-20	Total kill to date	82	94	109	70	166
	% marked	23	28	38	19	33

* No hunting was permitted on this area during 1960-61.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

August, 1964

Vol. 7, No. 8

1. Pheasant Populations and Land Use

J. E. Warnock, S. L. Etter

The standardized counts of pheasant broods made on the Sibley Study Area during July and August, 1964, revealed 23 percent fewer broods than were recorded in 1963 and 36 percent fewer broods than were recorded in 1962. One hundred fifty-nine broods were observed along 640 miles of roadside transect (two 40-mile routes were driven weekly), compared with 207 broods in 1963. Comparable counts were 249, 285, 235, 198, 240, and 194 broods in 1962, 1961, 1960, 1959, 1958, and 1957, respectively.

Apparently, a greater amount of successful late nesting occurred in 1964 than in 1963: in 1964, 41 of 132 broods observed along the last 320 miles of transect were 3 weeks of age or younger, compared with 14 of 143 broods observed during the same distance and period in 1963.

The number of adult pheasant hens observed during July and August along these same 640 miles of roadside decreased from 461 hens in 1963 to 392 hens in 1964, or 15 percent. Sixty-one percent of the adult hens observed in both 1963 and 1964 were broodless.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

In 1964, 68 pheasant nests were located in the 15 acres of seeded roadsides on the Sibley Study Area, compared with 44 in 1963, an increase of 54.5 percent; the number of established nests in the 15 acres of control roadside plots decreased 7.3 percent between the 2 years, from 41 nests in 1963 to 38 nests in 1964 (Table 1). Of the 68 nests established on seeded plots in 1964, 14 (20.6 percent) were successful, compared with 5 (13.2 percent) among the 38 nests established on control plots. In 1963, 38.6 percent (17 of 44) of the nests established on seeded plots were successful, compared with 17.1 percent (7 of 41) of the nests established on control plots. The number of successful nests per acre on seeded plots decreased from 1.1 in 1963 to 0.8 in 1964, a decrease of 27.3 percent; successful nests per acre on control plots decreased from 0.5 nest per acre in 1963 to 0.3 nest per acre in 1964 (40.0 percent). Thus, although total successful nest production decreased on seeded plots in 1964, it exceeded the production on control plots by 1.8 times; in 1963, the number of successful nests on seeded plots exceeded the number on control plots by 1.4 times.

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Table 1. Comparison of pheasant nesting characteristics on seeded and control roadsides, Sibley Study Area, 1963 and 1964.

Nests	Number of Nests					
	Seeded Plots			Control Plots		
	1963	1964	Percent Change	1963	1964	Percent Change
Established	44	68	+ 54.5	41	38	- 7.3
Hatched	17	14	- 17.6	7	5	- 28.6
Abandoned and/or Destroyed	27	54	+ 100.0	34	33	- 3.0

3. Factors Influencing Distribution and Abundance of Pheasants W. L. Anderson

In an effort to locate and observe pheasants on the Neoga Study Area, fields of tame hay and wheat stubble were systematically searched during the nights of August 5 and 6, 1964, with the aid of two trucks rigged for nightlighting. Fourteen pheasants were found by expending 14.9 truck-hours to search 575 acres of hay and stubble, an average of 0.9 pheasant per truck-hour of nightlighting. During corresponding periods in 1961, 1962, and 1963, averages of 5.2, 8.4, and 4.0 pheasants, respectively, were found per truck-hour of nightlighting. It is obvious that the pheasant population at Neoga was at a considerably lower level during the late summer of 1964 than during the same period in the 3 preceding years.

4. Responses of Bobwhites to Habitat Manipulation

J. A. Ellis, R. L. Westemeier

The primary objective of the trapping program on the Forbes, Dale, and Alma study areas during the spring and summer of 1964 was to capture and mark as many quail as possible. Trapping effort and placement of traps were aimed at satisfying this objective. Data on movements of adult cock quail were obtained during the trapping period, also.

Between May 19 and July 20, 1964, 195 individual adult cock quail were captured on the three study areas (Table 2). Ninety-five of these birds were recaptured 163 times. Forty-nine quail were recaptured at trap sites other than the sites of their original captures. The mean distance moved per bird varied among the three areas and, on each area, appeared to be small. In calculating the mean distance moved per bird, we included birds recaptured at the sites of their original captures. Quail recaptured only at the sites of their original captures accounted for 46, 38, and 63 percent of the recaptured quail on the Forbes, Dale, and Alma areas, respectively.

The farthest distance of recorded movement was 3.2 miles from the point of original capture. This quail was originally captured on the Alma Area and was recaptured 2 weeks later on the Forbes Area. Three tagged quail were sighted more

than 1 mile from the Forbes Area. However, all quail recaptured on the Forbes Area were less than 1 mile from the sites of their original captures; although the traps were distributed over a 3-mile area oriented northwest by southeast.

Movement records of bobwhites, based on recaptures, are thus far inconclusive. Radio-tracking appears to offer a better method of determining quail movements and their implication for management.

Table 2. Trapping and movement data for adult cock quail captured on the Forbes, Dale, and Alma study areas, May 19 - July 20, 1964. Movement data obtained from recaptures.

	<u>Forbes</u>	<u>Dale</u>	<u>Alma</u>	<u>Totals</u>
Individual Quail Captured	100	43	52	195
Number of Quail Recaptured	63	13	19	95
Number of Times Quail Were Recaptured	120	19	24	163
Number of Quail Yielding Movement Data	34	8	7	49
Mean Distance Moved per Bird (Yards)	274	164	568	
Range of Movement (Yards)	0 - 1,355	0 - 477	0 - 5,664	

5. Responses of Prairie Chickens to Habitat Manipulation

R. J. Ellis

Seventeen prairie chicken nests were discovered on 148 acres of grassland searched during June 1964. Fifteen of these nests were on the 77-acre Yeatter Prairie Chicken Sanctuary No. 1 and two were on the 20-acre Yeatter Prairie Chicken Sanctuary No. 2. In addition, four nests discovered by farmers were available for study. Eight nests reported by farmers were not observed by me.

Ten (59 percent) of the 17 nests found on the sanctuaries were successful. Six of the 17 were destroyed by predators and one was abandoned, probably because it was flooded.

The average number of eggs in 15 completed clutches was 9.7. The fertility of 101 eggs was 92 percent. The 21 nests examined were formed of dead grass or wheat straw and had layers of duff in the bottoms of the bowls, averaging 0.66 inch in thickness.

Farmers reported destroying 12 prairie chicken nests on the study area during 1964. Two of these nests were destroyed by mowers in clover fields and 10 were destroyed by plows in fields of wheat stubble and clover. No hens were reported killed by plows or mowers.

6. Rabbit Management

J. A. Bailey

It has previously been indicated that the spring population level of rabbits on the Allerton Park 4-H Area is independent of the previous fall population level and also of the number of rabbits harvested. However, the number of rabbits not harvested -- the fall population estimate minus the number of rabbits harvested -- is associated with the spring population level. Additional variation in the spring population can be explained by the total precipitation during December, January, and February. A correlation analysis of these two independent variables and the spring population levels of the past 8 years is presented in Table 3. (Records of the Decatur weather station are used to represent Allerton conditions.) The multiple regression coefficient and both partial regression coefficients are significantly different from zero at the 95 percent level of confidence.

Subjective appraisal of the snow records of the Decatur weather station does not indicate a relationship to the spring population estimate. It seems that snow itself does not cause an increase in rabbit mortality but that rain or wet conditions from melting snow do cause increased losses of rabbits and a decreased spring population. Hunting can also limit the spring population. However, during a wet winter, most of the rabbits that might have been saved by a reduction in hunting pressure would be lost anyway.

It must also be remembered that the fall population level does not depend upon the number of rabbits surviving the previous winter on the 4-H Area. Thus, although heavy hunting pressure can reduce the spring breeding population of rabbits in some years, it does not determine the number of rabbits available for the following year's hunting season in this kind of habitat. We must look to factors affecting natality and mortality during the spring and summer if we are to explain the variation in the fall population level. This has been pointed out by Steen (1944), and is generally true for small game species having high biotic potentials.

Steen, M. O. 1944. The significance of population turnover in upland game management. Trans. N. Am. Wildl. Conf. 9:331-335.

Table 3. The effect of hunting and of winter precipitation on spring population levels of rabbits on the 4-H Area, 1957-64.

Year	Fall Population Estimate A	Harvest B	Fall Population Not Harvested A-B=X ₁	Total Precipitation Dec., Jan., Feb., in inches (Decatur) X ₂	Spring Population Estimate Y
1956-57	333	113	220	6.62	47
1957-58	259	92	167	6.97	31
1958-59	324	109	215	5.69	132
1959-60	239	95	144	5.92	56
1960-61	309	none	309	4.56	161
1961-62	363	167	196	8.47	24
1962-63	107	none	107	2.30	61
1963-64	132	36	96	4.18	58
			$\bar{x}_1 = 181.8$	$\bar{x}_2 = 5.59$	$\bar{y} = 71.25$

Correlation Coefficients

Simple

$$r_{12} = + 0.31$$

$$r_{y1} = + 0.63$$

$$r_{y2} = - 0.39$$

Partial

$$r_{y1.2} = + 0.86^*$$

$$r_{y2.1} = - 0.79^*$$

Multiple

$$R_{y.12} = 0.88^*$$

Regression Equation

$$Y = 58.25 + 0.59 X_1 - 16.80 X_2$$

* Significant at the 0.05 level of probability.

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

September, 1964

Vol. 7, No. 9

1. Pheasant Populations and Land Use

J. E. Warnock, S. L. Etter

In 1964, as in the previous 7 years (1957-63), nesting data were collected by searching the northwest one-quarter (10 acres) of 100 randomly selected 40-acre plots for pheasant nests; this 1,000-acre sample represented 4.3 percent of the 23,200-acre study area. In 1964, 248 nests were located and 29 (11.7 percent) of these hatched. These data reveal a 45.3 percent decrease from the number of established nests (453) and a 64.2 percent decrease from the number of successful nests (81) found on the 1,000-acre sample during 1963.

Four pheasant nests were found in 50 acres of soybeans in 1964, compared with 5 nests found in 50 acres of soybeans searched in 1963. Three of the five nests found in soybeans in 1963 were successful; none of the 4 found in 1964 were successful. However, one successful nest was observed in soybeans in 1964, beyond the boundaries of the 100, 10-acre plots, and several reliable reports from farmers indicate that some successful pheasant nests did occur in soybeans in 1964 on the study area. We believe that many of the unusually young pheasants observed in August 1964 (See Monthly Wildlife Research Letter, August, 1964) may have come from successful nests situated in fields of soybeans.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

The practicality of seeding grass-legume mixtures on roadsides throughout a large area (township or county) to improve nesting cover for pheasants depends upon three important considerations: (1) it must be established that pheasant nest densities and nest success will be substantially higher on the seeded roadsides than on unseeded roadsides; (2) methods must be devised to insure good quality stands of grasses and legumes at the initial seeding which, by eliminating most weeds, will make mature seedings acceptable to farmers and road maintenance personnel; and (3) a method of seeding must be developed which makes it feasible to manipulate large acreages with a minimum of time and expenditures.

When the initial 7 miles of study plots were established on the Sibley Study Area during the spring of 1962, the planting procedure included plowing, disking, and harrowing, followed by hand-seeding with a cyclone seeder. This method was time consuming and costly, and success in establishing good stands of grasses and legumes varied greatly. Based on criteria for measuring the establishment of stands of seeded grasses and legumes, approximately 3 of the 7 miles of manipulated roadsides planted in 1962 could be classified only as fair to poor pheasant nesting habitat the following summer (1963). Significant weed problems prevailed on

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some plots. Although the quality of the seedings was much improved the following summer (1964) and the weed problems were somewhat diminished, it is still considered impractical to establish extensive numbers of seedings over a broad area with the methods employed in the spring of 1962.

In an attempt to improve the quality of seeded plots, additional seedings were undertaken during the late summers of 1963 and 1964. After plowing and disking, mechanical seeding by use of a brillion seeder was employed on a mile-long plot (2 acres) during August 1963; during September 1964, an additional mile was seeded by the same method. Also, a hydro-seeder provided by the State Highway Department was used to seed a mile of roadside during September 1964. The hydro-seeder, a machine which applies the seed mixture under high pressure with the use of water, is used primarily for rapid seeding of slopes along highways. The plots seeded with the brillion and the hydro-seeder are adjacent, so that the comparative success of the seedings can be evaluated. The mile of roadside seeded with the brillion seeder in August 1963 provided relatively weed-free, high quality pheasant nesting cover the following summer. The brillion seeder is superior to hand application with a cyclone seeder because it distributes the seed more evenly and makes a firm seed bed. A reliable comparison between the success of the brillion and the hydro-seeder applications in September 1964 will not be possible until next summer when the seedings mature, although the two applications appeared to have similar rates of germination approximately 3 weeks after seeding. Assuming both seeding methods result in comparable stands of grasses and legumes, the principal value of the hydro-seeder would lie in its great speed of application, approximately 25 times faster than the brillion seeder and 50 times faster than the hand cyclone seeder.

Although it appears that both the brillion and the hydro-seeder may provide highly reliable and (particularly in the case of the hydro-seeder) rapid means of establishing seedings, both can be applied only to seed beds previously plowed and disked. Therefore, the best way to establish seedings with only minimum tillage appears to lie in some form of chemical seedbed preparation which employs one of several chemical defoliantes developed for use in pasture renovation. This method combines spraying and seeding in the same operation, with the sprayer attached to a specially designed sod seeder. The use of such a chemical on a segment of roadside on the Sibley Study Area during September 1964 will be discussed in a later report.

3. Factors Influencing Distribution and Abundance of Pheasants W. L. Anderson

As in past years, indications of reproductive success of pheasants experimentally released on the Neoga and Bellmont areas, located south of the established pheasant range, were obtained during the summer of 1964 by observations and by interviews with farmers. At Bellmont, 52 individual broods were located; 15 of these broods were accompanied by California hens, 27 by California or native hens, 1 by a Korean hen, and 9 by hens of undetermined origin. On this area, each of 14 broods for which the counts of chicks were thought to be complete had an average of 5.9 ± 0.2 chicks (average age 5.9 weeks). In addition, 71 percent (15) of 21 hens

observed during July and August were accompanied by broods. These data suggest that reproductive success at Bellmont was similar to that of pheasants within the range occupied by self-maintaining populations.

At Neoga, only 10 individual broods were located in 1964. Five broods in which all chicks were thought to be counted had an average of 4.0 ± 2.0 chicks (average age 7.4 weeks). Because of the low level of abundance of pheasants at Neoga, other information concerned with reproductive success was not obtained for this population.

4. Responses of Bobwhites to Habitat Manipulation

J. A. Ellis, R. L. Westemeier

During the spring and summer trapping program, 331 (303 cocks and 28 hens) weights were obtained from bobwhites captured on the Dale, Forbes, and Alma study areas (Table 1). These weights were recorded from 51 cocks and 8 hens on the Dale Area, 100 cocks and 15 hens on the Forbes Area, and 52 cocks and 4 hens on the Alma Area. Weights of recaptured quail were not recorded if the quail had been weighed within a 7-day period prior to recapture.

On each area, the mean weight of hens was greater than the mean weight of cocks. Hens captured during the trapping period were examined and, apparently, most were laying. The 150-gram hen captured on the Forbes Area was accompanied by a brood of 12 chicks, 1-2 days old. The weight of this hen was possibly a reflection of the stress associated with incubation.

The mean weight of cocks on the Alma Area, 168.0 ± 1.3 grams, differed significantly at the 5 percent level from the mean weights of cocks on the Forbes Area, 165.6 ± 0.7 grams, and the Dale Area, 163.4 ± 1.5 grams. There was no significant difference between the mean weight of cocks on the Dale Area and the mean weight of cocks on the Forbes Area.

Table 1. Weights (in grams) of adult quail captured on the Dale, Forbes, and Alma study areas, May 19 - July 20, 1964. Any two means not underscored by the same line are significantly different at the 5 percent level for a particular sex class.

	Cocks			Hens		
	<u>Dale</u>	<u>Forbes</u>	<u>Alma</u>	<u>Dale</u>	<u>Forbes</u>	<u>Alma</u>
Sample Size	54	180	69	8	16	4
Mean Weight	<u>163.4 ± 1.5</u>	<u>165.6 ± 0.7</u>	168.0 ± 1.3	<u>188.2 ± 1.5</u>	<u>194.6 ± 4.9</u>	<u>191.0 ± 3.0</u>
Range	142-195	135-190	143-193	165-210	150-220	184-194

5. Responses of Prairie Chickens to Habitat Manipulation

R. J. Ellis

Twenty-one prairie chicken broods were reported or observed on the Bogota Study Area during the summer of 1964. Counts or reasonable estimates of the number of young per brood were available for 13 broods. Estimates of the size of the young were available for 16 broods. The ages of the young whose approximate size was known were estimated using the method of Baker (1953: pls. 2 and 3) and unpublished data of Stan Etter (personal communication).

Prairie chicken broods observed on the Bogota Study Area during 1964 were smaller than those observed in 1963 (Table 2), a condition probably related to decreased fertility of eggs. In 1964, the fertility of 101 eggs was 92 percent; in 1963, the fertility of 116 eggs was 97 percent. The lower fertility of eggs in 1964 seemed to be associated with the wet spring. One nest was found in which all eggs became infertile due to flooding. Some infertility of eggs found in successful nests may have been due to excessive moisture.

The mowing of a 20-acre clover field adjacent to the 77-acre Yeatter Prairie Chicken Sanctuary No. 1 on June 8, 1964, further reduced brood sizes. The mower operator reported encountering five broods as he mowed. Two small young killed by the mower were accidentally found. Probably other dead also were in the field. This incident demonstrates that hayfields adjacent to good nesting cover may be detrimental to prairie chickens if small broods are present at the time of mowing.

May 22 was the estimated mean date of hatching of 16 prairie chicken broods on the Bogota Study Area during 1964. This date was 10 days earlier than the mean date of hatching of 14 broods on the same area during 1963. The difference in hatching dates between the 2 years could be related to climatic differences or to errors in aging broods.

Table 2. Numbers of young in prairie chicken broods, Bogota Study Area, 1964. Numbers in parentheses are sample sizes.

Estimated Age of Young in Weeks	Average Number of Young per Brood	
	1963	1964
4	9.0(4)	8.5(2)
5	9.0(3)	5.3(3)
6	---(0)	5.3(6)
7	6.0(1)	5.5(2)
8	6.5(2)	---(0)
Average	8.2(10)	5.8(13)

6. Rabbit Management

J. A. Bailey

Although the number of rabbits present in early March on the Allerton Park 4-H Area has varied from year to year (Monthly Wildlife Research Letter, August, 1964), we have not been able to detect a statistically significant difference among the fall population estimates (Table 3). There is no significant difference among the estimates of fall population density for the first 6 years of this study; these are estimates of the population density in early October. Because of a change in the census technique, the estimates made in 1962 and 1963 are more appropriate for the population density in mid-November and hence can not be compared with the earlier estimates.

The data suggest that the maximum population of rabbits on the 4-H Area is about the same each year, despite the fact that overwintering success may vary considerably. If this is true, potent density-dependent mechanisms must be involved in the natality and/or mortality rates during the summer. Only five rates of population gain can be calculated from these data (Table 3). When graphed over the spring population estimates, these points suggest a negative geometric curve such as Errington (1957) found in rates of population gain for marsh-dwelling muskrats. Errington described density-dependent population phenomena in several of his papers on muskrats. It would not be surprising if most of his theories also applied to rabbits.

Of considerable interest in this regard were our recent discussions with research workers in Missouri. The Missouri biologists are studying the physiology of stress-related mortality of rabbits in high-density populations. It appears that some mechanism inherent in the physiological-psychological nature of this species can respond to the relationship between habitat quality and population density by increasing the mortality rate of at least some segment of the population. In this manner, a rather delicate balance between habitat quality and population density can be maintained.

Errington, P. L. 1957. Of population cycles and unknowns. Cold Spring Harbor Symposia on Quant. Biol. 22:287-300.

Table 3. Estimates of rabbit abundance and rates of population gain on the Allerton Park 4-H Area.

<u>Year</u>	<u>Spring Population</u>	<u>Fall Population</u>		<u>Rate of Population Gain (Percent)</u>
	<u>March</u>	<u>Early October</u>	<u>Mid-November</u>	
1956	--	333	---	---
1957	47	259	---	451
1958	31	324	---	945
1959	132	239	---	81
1960	56	309	---	452
1961	161	363	---	125
1962	24	---	107	---
1963	61	---	132	---
1964	58	---	---	---

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

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1. Pheasant Populations and Land Use

S. L. Etter

Estimates of the comparative numbers of pheasant chicks on the Sibley Study Area during the last 3 years indicate there were 30.6 percent fewer chicks in 1964 than in 1963 and 46.7 percent fewer chicks than in 1962. These estimates were based on the numbers of broods observed while driving 640 miles of roadside transect (Monthly Wildlife Research Letter, August, 1964) and on the average number of chicks per brood in broods judged by the observers to be completely counted. The average brood size declined from 5.61 and 5.18 chicks in 1962 and 1963 to 4.65 chicks in 1964.

The sharp decline in pheasant production appeared to have been the result of a drastic reduction in available nesting cover and an unusually late nesting season. Fields of tame hay, the best nesting cover, declined from 14.2 percent and 8.7 percent of the 100, 10-acre study plots in 1962 and 1963 to 4.4 percent in 1964.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

Various methods employed to establish grass-legume mixtures on roadsides to improve nesting cover for pheasants were discussed in the September 1964 Monthly Wildlife Research Letter. It was concluded that seeding methods successful in producing adequate stands of grasses and legumes were, nevertheless, impractical as a means of establishing extensive numbers of seedings over broad areas because the planting procedures required are time consuming and expensive.

Therefore, the best way to establish seedings with only minimum tillage appears to lie in some form of chemical seed bed preparation which employs one of several chemical defoliates developed for use in pasture renovation. One such chemical, Ortho Diquat, distributed by the Standard Oil Company, was tested on $\frac{1}{4}$ mile of roadside on the Sibley Study Area in September 1964. This chemical has been tested in several western states, and is being used to renovate pastures and other areas where terrain or other factors make tillage impossible. In these instances, spraying (to kill the existing vegetation) and seeding are usually combined in the same operation, the sprayer being attached to a specially designed sod seeder. This method has proven to be rapid and less costly than breaking the ground prior to seeding.

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The vegetation on the $\frac{1}{4}$ mile of roadside (0.6 acre) treated on September 17 consisted primarily of bluegrass, with a few broadleaf weeds scattered throughout. Approximately 1.8 pints of the chemical diluted in 100 gallons of water were applied. It was estimated that nearly 90 percent of the vegetation on the roadside was dead by September 21. Because it was not possible to arrange for a sod seeder, half of the treated roadside (220 yards) was disked and seeded with a billion seeder; the plan is to seed the other half with a sod seeder next spring.

The success of Ortho Diquat in killing the established vegetation on this roadside is encouraging. Further testing with other application rates and other chemicals is planned. It is believed that if a sod seeder can be obtained or developed that can place grass and legume seeds in the soil at a rate and in a distribution pattern approximating broadcast seeding, this will constitute a relatively fast and economical technique of establishing seedings.

3. Factors Influencing Distribution and Abundance of Pheasants W. L. Anderson

It has been suggested that the failure of ring-necked pheasants to become established south of the 39th parallel in Illinois and other midwestern states might be due to the deficiency of a nutritional element in these areas. Therefore, to obtain a general indicator of health, body weights were taken from pheasants (cocks and hens) captured by nightlighting and cocks shot by hunters on the Neoga Study Area. Neoga, located about 30 miles south of the established pheasant range in Illinois, is the site at which pheasants have been experimentally released for the past several years. From 1960 through 1964, 802 pheasant weights were taken from birds reared on the area.

Analysis of these weight data revealed that pheasants reared at Neoga weighed (Table 1), on the average, as much as birds within the established pheasant range of North America. This was true for pheasants of all sex and age classes and for all seasons in which weights were obtained on the Neoga Study Area. The average weight of juvenile pheasants reared at Neoga increased rapidly until about 14 weeks of age, then increased slightly during the fall and winter (Table 1). The average weight of adult birds, lightest during late summer, also increased during the fall and winter (Table 1). Such patterns in weight changes are similar to those reported for pheasants within the range occupied by thriving populations of pheasants. These findings indicate that the basic factor or factors, whether nutritional or some other, preventing the southward extension of the pheasant range in Illinois do not affect rate of growth and maintenance of body weight.

Table 1. Mean body weights (in pounds) of native pheasants* captured by night-lighting or shot by hunters on the Neoga Study Area, 1960-64. Sample sizes are in parentheses.

Date	Age in Weeks	Cocks	Hens
Juveniles			
Aug.-Sept.	5	0.44±0.02(12)**	
"	6	0.71±0.02(11)**	
"	7	0.94±0.02(14)	0.86±0.02(12)
"	8	1.13±0.03(12)	0.94±0.02(11)
"	9	1.43±0.04(15)	1.14±0.03(16)
"	10	1.69±0.04(20)	1.36±0.02(38)
"	12	2.11±0.04(35)	1.66±0.03(31)
"	13	2.42±0.03(32)	1.70±0.02(25)
"	14	2.63±0.04(36)	1.89±0.04(25)
	More than		
Sept.-Nov.	14	2.80±0.01(194)	2.01±0.02(118)
Jan.-Feb.		2.96±0.05(17)	2.06±0.03(30)
Adults			
Aug.-Sept.		2.73±0.02(11)	1.93±0.03(20)
Oct.-Nov.		2.95±0.04(18)	2.03±0.03(33)
Jan.-Feb.		3.10±0.02(4)	2.12±0.05(12)

* Includes all pheasants (various strains) hatched on the study area.

** Includes both sexes.

4. Responses of Bobwhites to Habitat Manipulation

J. A. Ellis, R. L. Westemeier

It is suspected that sooner or later the bobwhite will eat or sample incidentally most objects of swallowable size in its environment. Because of this behavioral characteristic, the items found in the crops of quail could be considered to reflect some of the ecology of a given area.

Two hundred ninety-four crops were removed from quail on the Dale and Forbes areas during the 1963 hunting season (November 16 - December 31). Contents of the crops were identified; the 10 items that occurred most frequently are listed in Table 2. Forty-two plant food items were identified in crops from the Dale Area, 32 in crops from the Forbes Area.

Approximately 50 food patches ranging in size from 0.5 to 3.0 acres were established on each area by the Department of Conservation. The patches were planted to milo, buckwheat, cowpeas, and three millets, proso, pearl, and German, and provided cover, as well as food, for quail. Milo, and proso and German millets ranked among the first 10 foods according to frequency of occurrence in crops from the Dale Area. Milo was the only item planted in the food patches that ranked among the first 10 foods in crops from the Forbes Area. Common ragweed occurred in 50 percent of the 294 crops and ranked first according to frequency of occurrence in crops from the Dale Area. The two food items most frequently found in crops from the Forbes Area were common ragweed and acorns; each occurred in 28.2 percent of the crops. Korean lespedeza was found in 35 percent of the crops from the Dale Area and in 24 percent of the crops from the Forbes Area. Common ragweed, acorns, and Korean lespedeza have been found to be staple food items of quail in other areas of southern Illinois.

Table 2. The 10 top-ranked food items (percent of occurrence) found in crops of quail harvested on the Dale and Forbes areas in 1963. The Dale sample represents 138 crops (11 empty); the Forbes sample, 156 crops (28 empty).

Food Items	Times Represented	Percent Frequency of Occurrence	Rank
		<u>Dale Area</u>	
Common ragweed (<u>Ambrosia artemisiifolia</u>)	68	50	1
Korean lespedeza (<u>Lespedeza stipulaceae</u>)	48	35	2
Milo (<u>Sorghum vulgare</u>)	41	30	3
Leafy material	25	18	4
Fall panicum (<u>Panicum dichotomiflorum</u>)	23	17	5
Small wild bean (<u>Strophostyles leiosperma</u>)	22	16	6
Proso millet (<u>Panicum miliaceum</u>)	20	14	7
Japanese millet (<u>Echinochloa crusgalli</u> , var. <u>frumentacea</u>)	16	12	8-9
German millet (<u>Setaria italica</u>)	16	12	8-9
Smooth crabgrass (<u>Digitaria ischaemum</u>)	15	11	10

		<u>Forbes</u>	<u>Area</u>
Common ragweed (<u>Ambrosia artemisiifolia</u>)	44	28	1-2
Acorn fragments (<u>Quercus</u> spp.)	44	28	1-2
Korean lespedeza (<u>Lespedeza stipulaceae</u>)	38	24	3
Soybeans (<u>Glycine max</u>)	24	15	4
Jewelweed (<u>Impatiens pallida</u>)	23	15	5
Wheat (<u>Triticum aestivum</u>)	14	9	6
Leafy material	14	9	7
Milo (<u>Sorghum vulgare</u>)	13	8	8
Corn (<u>Zea mays</u>)	11	7	9-10
Fall panicum (<u>Panicum dichotomiflorum</u>)	11	7	9-10

5. Responses of Prairie Chickens to Habitat Manipulation

R. J. Ellis

It is generally agreed that loss of nesting cover is the factor most responsible for reduced prairie chicken numbers in the United States (Hamerstrom et al. 1957:87). There is less agreement on the characteristics of optimum nesting cover for prairie chickens. Information obtained during a study of 15 nests discovered at Bogota in 1963 and 21 nests discovered on the same area in 1964 permits a better understanding of these characteristics.

Thirty-four (94.4 percent) of the 36 nests were made of dead grass. One nest (2.8 percent) was made of dead red clover and another of dead weed stems. Grasses were the dominant plants at the sites of 17 (47.2 percent) of the nests. Twelve (33.3 percent) of the nest sites were dominated by grass-legume mixtures. Other nests were found in legumes, grass-weed mixtures, legume-weed mixtures, and weeds.

Twenty-one (58.3 percent) of the nests were in vegetation 11 to 20 inches tall. Eight (22.2 percent) were in shorter cover and seven (19.4 percent) in taller cover.

Twenty-three (54.8 percent) of 42 nests (the 36 discussed above plus 6 reported by farmers) known from the Bogota Study Area were located on the highest one-third of the area. The lowest one-third had five (11.9 percent) of the nests; the middle one-third had 14 (33.3 percent).

These data suggest that the prairie chickens at Bogota preferred nest sites on high elevations, dominated by grasses 11 to 20 inches tall. A layer of dead grass for use in nest construction was also a characteristic of preferred nest sites.

Hamerstrom, F. N., Jr., O. E. Mattson, and Frances Hamerstrom. 1957. A guide to prairie chicken management. Wisconsin Conserv. Dept. Tech. Wildl. Bull. 15. 128pp.

6. Rabbit Management

J. A. Bailey

Lord (1963:14-15) described a statistically significant but unexplained difference between the number of cottontail rabbits seen on north-south roads and the number seen on east-west roads in Champaign County. His data were derived from roadside counts made during December and January. Since most of the small amount of suitable rabbit cover present on Champaign County farmland during the winter is associated with farm homesites, it was thought that Lord's roadside data might indicate a correlation between the number of rabbits seen and the number of homesites along the routes driven in his survey, and that the number of homesites present might be correlated with the hilliness of the terrain. If so, these correlations would help to substantiate Lord's suggestion that rabbit abundance is associated with hilly terrain.

Accordingly, Lord's original data were reviewed. The number of homesites along roads was obtained from the appropriate 1957 U. S. Geological Survey quadrangle maps. All homesites judged to be within 500 feet of the road were counted. These data are presented in Table 3. A multiple correlation analysis of the entire sample is also presented. None of the correlation coefficients are large enough to be considered evidence of correlation. It was concluded that winter roadside counts of rabbits are extremely variable and that meaningful correlations explaining rabbit distribution would be difficult to obtain in this manner. The negative, though not statistically significant, correlation between number of rabbits seen and hilliness, obtained when the data were analyzed in the manner described, casts doubt upon Lord's belief that rabbit abundance is associated with hilly terrain in Champaign County.

The most consistent implication of these data is that more rabbits were seen on north-south roads than on east-west roads; we still cannot explain why.

Lord, R. D., Jr. 1963. The cottontail rabbit in Illinois. Illinois Dept. Conserv. Tech. Bull. 3. 94pp.

Table 3. Number of rabbits seen during a winter roadside count in Champaign County, in relation to orientation of roads, frequency of farm homesites, and hilliness.

U.S.G.S. Quadrangle	North-South Roads				East-West Roads			
	Number of Miles	Homesites per Mile X_1	10-foot Contours per Mile X_2	Rabbits Seen per Mile Y	Number of Miles	Homesites per Mile X_1	10-foot Contours per Mile X_2	Rabbits Seen per Mile Y
Mahomet	195.5	2.210	2.466	0.240	185.1	2.123	2.599	0.189
Urbana	193.3	2.447	1.837	0.305	188.3	2.379	2.002	0.218
Villa Grove	201.1	1.959	1.929	0.313	203.9	2.001	1.751	0.142
Tuscola	186.0	2.167	1.048	0.360	201.4	2.249	1.509	0.243
Gibson City	216.0	1.782	2.259	0.477	190.5	2.068	2.173	0.299
Paxton	192.5	1.891	2.343	0.281	195.3	2.023	2.186	0.256
Average	-----	2.069	1.992	0.332	-----	2.139	2.027	0.224

Correlation Coefficients

Simple

$$r_{12} = -0.288$$

$$r_{y1} = -0.365$$

$$r_{y2} = -0.128$$

Partial

$$r_{y1.2} = -0.423$$

$$r_{y2.1} = -0.261$$

MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

November, 1964

Vol. 7, No. 11

1. Pheasant Populations and Land Use

S. L. Etter

A ratio of 3.0 young pheasants (both sexes) per adult hen was found among 507 pheasants captured on the Sibley Study Area during October and early November, 1964, whereas a ratio of 3.4 young per adult hen was found among 1,001 pheasants captured during the same period in 1963. In 1964, age ratios within sexes were 1.5 young hens per adult hen and 6.6 young cocks per adult cock; comparable figures for 1963 were 1.7 for hens and 9.6 for cocks. The 1964 sample of 507 pheasants was comprised of 40.6 percent cocks and 59.4 percent hens. Percentages of cocks within age groups were 18.4 for adults and 49.7 for juveniles (14.9 and 49.6 in 1963).

These data suggest a lower rate of production in 1964 than in 1963 and/or a lower rate of adult hen mortality in late summer and early fall of 1964 than during the same period in 1963. However, it appears from the data on nesting success and numbers of broods observed along standardized routes during both years (Monthly Wildlife Research Letters; August, September, October; 1963, 1964) that production was considerably lower in 1964 than is indicated by the ratio of juvenile pheasants per adult hen in the fall trapping sample. The lower ratio of juvenile cocks per adult cock in 1964 and the higher percentage of cocks among adult pheasants also suggest that the low rate of production during 1964 was partially masked by a higher rather than a lower rate of adult hen mortality.

2. Manipulation of Pheasant Habitat

G. B. Joselyn

The densities of established nests on seeded roadside plots were compared with corresponding data obtained from 100, 10-acre plots on the Sibley Study Area during 1963 and 1964 (Table 1). The rate of nest establishment on seeded roadside plots in 1963 (291 nests per 100 acres) was exceeded only by those which occurred in unharvested tame hay (322 nests per 100 acres) and harvested tame hay (310 nests per 100 acres); on a per acre basis, all other cover types had lower nest densities.

In 1964, seeded roadsides far exceeded all other cover types in rate of nest establishment (381 nests per 100 acres). The cover type having the second highest rate was unharvested tame hay, with 281 nests per 100 acres. Next, in descending order, were strip cover, harvested tame hay, small grains, pastures, and nonagricultural areas, with 218, 187, 61, 50, and 20 nests per 100 acres, respectively.

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These data show that nest densities in four of these six cover types on the Sibley Study Area decreased from 1963 to 1964; only strip cover and small grains had increased densities. Nest density on seeded roadsides increased from 1963 to 1964 while declining in the majority of other cover types on the study area.

Table 1. Densities of established pheasant nests on seeded roadside plots and in six other cover types, Sibley Study Area, 1963 and 1964. Data for the six cover types were obtained from 100, 10-acre plots comprising a 4.3 percent sample of the 23,200-acre study area.

Cover Type	Established Nests per 100 Acres	
	1963	1964
Seeded Roadsides	291	381
Unharvested Tame Hay	322	281
Strip Cover*	154	218
Harvested Tame Hay	310	187
Small Grains	35	61
Pastures	114	50
Nonagricultural Areas	30	20

* Includes roadsides, fencerows, waterways, etc.

3. Factors Influencing Distribution of Pheasants in Illinois W. L. Anderson

Analyses of data obtained during the past 5 years have revealed some interesting relationships between body weights and rates of survival of hen pheasants on the Neoga Study Area. Hens introduced at Neoga, and native hens captured on the area, were classified as light, medium, and heavy weight. The medium-weight class included all hens whose weights at the times of release were within 1 standard deviation of the mean weight computed for adults and for juveniles of each strain. The light- and heavy-weight classes included the remaining birds.

Considering the introduced pheasants, known losses were least among medium-weight hens, slightly greater among heavy-weight hens, and greatest among light-weight hens (Table 2). In general, this was the pattern for hens of both age groups of all introduced strains. However, mortality of native hens of the three weight classes, particularly the juveniles, was found to increase with body weight (Table 2). Although the ecological implications of these findings are not clear, they do give rise to some interesting questions. Are the losses among heavy-weight hens reared at Neoga of sufficient magnitude to prevent establishment of a self-maintaining population? Is the increased rate of death among heavy-weight hens reared at Neoga a direct cause and effect phenomenon? What factor or factors caused heavy-weight hens to suffer greater losses than hens in the medium- and light-weight classes? Is selection for a smaller pheasant taking place on the Neoga Area?

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Table 2. Percent mortality of light-, medium (mean $\pm$ 1 SD)-, and heavy-weight hen pheasants from times of winter release (introduced pheasants) or of fall capture (native pheasants) to approximately the following May 1, Neoga, Illinois, 1959-60 through 1962-63. Numbers of pheasants weighed at times of release, or of capture, are in parentheses.

Juveniles			Adults			Both Ages		
Light	Medium	Heavy	Light	Medium	Heavy	Light	Medium	Heavy
INTRODUCED PHEASANTS*								
30 (227)	18 (1021)	21 (220)	35 (52)	27 (235)	31 (49)	30 (279)	20 (1256)	23 (269)
NATIVE PHEASANTS								
7 (15)	11 (88)	27 (15)	25 (4)	24 (25)	25 (4)	11 (19)	14 (113)	26 (19)

* Includes wild pheasants from east-central Illinois and southwest Kansas, and game-farm pheasants from California, Korean, and Japanese stock.

4. Responses of Bobwhites to Habitat Manipulation

J. A. Ellis, R. L. Westemeier

Chronology of quail hatching on the Dale, Forbes, and Alma areas in 1964 was determined from two samples of juvenile quail. One sample consisted of 24 quail broods flushed during the summer months. Size, and plumage characteristics, were used to estimate the ages of these broods. The other sample consisted of 81 individual quail captured by nightlighting in September and October; these juvenile quail were aged to the nearest week by the progress of the molt of the primary flight feathers. Surprisingly, all groups of these night-roosting quail contained juvenile birds of different ages. Age variations among these juveniles ranged from 6 to 16.5 weeks within the same group. The age composition of these night-roosting quail indicated that the groups were composed of chicks from different clutches, or, if they were from the same clutch, that the molt of primary feathers was highly variable.

The chronology of hatching as determined from the brood sample indicates an earlier and more prolonged period of hatching than does that determined from the nightlighted sample (Table 3).



Table 3. Distribution of dates of quail hatching on the Forbes, Alma, and Dale areas in 1964.

Percent of Broods Hatched by End of Period (Cumulative)	Dates of Hatching	
	According to Estimated Ages of 24 Broods	According to Primary Wing Molt of 81 Nightlighted Quail
25	May 16 - 30	June 15 - 29
50	May 31 - June 14	June 30 - July 14
75	June 30 - July 14	July 15 - 29
100	August 30 - September 14	August 15 - 29

5. Responses of Prairie Chickens to Habitat Manipulation

R. J. Ellis

The need which prairie chickens have for grassland, particularly undisturbed grassland, was demonstrated in 1963 when 850.7 acres of potential nesting cover on the Bogota Study Area were searched. Nine of the 11 prairie chicken nests found were in 134.5 acres of idle grassland (Ellis 1964: Table 5). In May, 1964, it was pointed out that the federal conservation reserve contracts were expiring rapidly and that the fields concerned were being put back into agricultural production (Monthly Wildlife Research Letter, May, 1964). In recent years these fields provided the largest part of the undisturbed grassland available for prairie chicken nesting.

To detect changes in land use in the prairie chicken range of Illinois, particularly the reduction of grasslands, cover on the areas where prairie chickens are censused annually (Monthly Wildlife Research Letter, April, 1964) was mapped in the spring of 1964 and again in late summer, 1964. The spring mapping revealed the cover present during the summer of 1963; the summer mapping revealed the cover present during the summer of 1964 (Table 4).

The changes in land use from 1963 to 1964 were detrimental to prairie chicken welfare. All cover types which prairie chickens might utilize for nesting were reduced; grain crops were increased.

Table 4. Land use on 10 prairie chicken census areas (76,720 acres) in Illinois, 1963 and 1964, expressed as percentage of total area.

	1963	1964
Grain Crops	74.2	78.0
Legume Hay	2.3	1.6
Legumes*	.9	.6
Grass Hay	2.3	2.0
Grass*	4.2	3.6
Grass Pasture	9.2	6.7
Weeds*	.3	1.4
Trees and Brush	4.4	3.4
Other Uses	2.2	2.7

* Idle fields.

Ellis, Ralph J. 1964. Responses of bobwhites and prairie chickens to habitat manipulation (B. Prairie chickens). Pittman-Robertson Job Completion Rept. W-66-R-3, Job 13. 11 + [15] pp.

6. Rabbit Management

J. A. Bailey

Study of the population of cottontail rabbits on the Allerton Park Sanctuary has been discontinued. This population has been difficult and expensive to study and the population estimates obtained have lacked needed precision. Discontinuance of rabbit research on the Sanctuary makes it possible to concentrate our efforts on studying the population of cottontails on the nearby 4-H Area.

The cottontail population on the 4-H Area is now being sampled by livetrapping for 10 days each month, using about 290 traps. A trapping period during September of this year initiated the program. During October, 48 of the captured rabbits were marked by dyeing their tails yellow with a picric acid solution (Lord 1963:58). During November, 35 of the rabbits were marked by dyeing their tails red with a solution of Calcofast Red and Calcozine Rhodamine B (American Cyanimid Company) in 95 percent alcohol. The red dye tended to fade and was not entirely satisfactory.

On November 21, a drive was conducted on the 4-H Area with the assistance of wildlife management students of the University of Illinois. There were 113 observations of rabbits; 33 had white tails, 39 had red tails, and 41 had yellow tails. Population estimates applicable to early October and to early November can be calculated by considering the marked segments of the population separately. (See Monthly Wildlife Research Letter, April, 1964, for the method of calculation.) It is estimated with 95 percent confidence that there were 132 ± 32 rabbits on the 4-H Area in early October and 101 ± 26 rabbits in early November. If the two marked segments of the population are combined, it can be estimated with 95 percent confidence that there were 117 ± 14 rabbits on the 4-H Area in late October. The indicated mortality from early October to early November is 31 per 132 or 23 percent.

When 9 years of data on the cottontail population of the 4-H Area are considered (Table 5), it appears that this population crashed in 1962 and has never recovered. Fall population densities seem to have varied little during the past 3 years, although our data indicate that this year's population of rabbits on the 4-H Area is slightly smaller than last year's.

Lord, Rexford D., Jr. 1963. The cottontail rabbit in Illinois. Illinois Dept. Conserv. Tech. Bull. 3. 94pp.

Table 5. Estimates of cottontail rabbit abundance on the Allerton Park 4-H Area, 1956-64.

Year	Spring Population	Fall Population	
	March	Early October	Early November
1956	--	333	--
1957	47	259	--
1958	31	324	--
1959	132	239	--
1960	56	309	--
1961	161	363	--
1962	24	107	--
1963	61	---	132
1964	58	132	101

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MONTHLY WILDLIFE RESEARCH LETTER

Department of Conservation and Natural History Survey, Cooperating

Glen C. Sanderson and Helen C. Schultz, Editors

Urbana, Illinois

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1. Pheasant Populations and Land Use

S. L. Etter

The age ratio of 420 cock pheasants shot by hunters and examined by biologists on the Sibley Study Area during the 1964 hunting season was 8.8 juveniles per adult. A ratio of 6.6 juveniles per adult was obtained from 206 cocks captured by night-lighting prior to the hunting season. The crippling rate reported by 414 hunters interviewed in 1964 averaged 21.0 percent.

The success of hunters on opening day in 1964 was slightly better than in 1963 in spite of a 30-35 percent decrease in the number of cocks available for harvest (Monthly Wildlife Research Letters; August, September, October; 1964). The 256 hunters interviewed on opening day in 1964 bagged a cock, on the average, every hour and 59 minutes, whereas 265 hunters interviewed on opening day in 1963 required, on the average, 2 hours and 8 minutes to bag a cock. The increased hunter success in 1964 appeared to be due to a concentration of pheasants in and near the small amount of cover which remained after an unusually large percentage of farmland was fall-plowed. Light hunting pressure after opening day, when more time was required to bag a cock, also contributed to the higher hunter success in 1964.

Table 1. Pheasant-harvest data obtained by interviewing hunters on the Sibley Study Area during the 1960-64 hunting seasons.

Year	Number of Hunters Interviewed	Number of Cocks Aged by Bursal Examination	Age Ratio of Bagged Cocks (Young per Adult)	Gun-Hours per Bagged Cock	Cocks Crippled and Lost per 100 Downed
1960	496	441	8.3	3.1	31.9
1961	443	402	7.0	2.8	20.9
1962	833	812	11.9	3.3	13.0
1963	468	441	9.2	3.1	24.3
1964	414	420	8.8	2.5	21.0

2. Manipulation of Pheasant Habitat

G. B. Joselyn

Eighty-five pheasant nests were found on the seeded and managed control roadside plots in 1963, 44 nests on seeded plots and 41 on control plots (Table 2). In 1964, 106 nests were located, 68 on seeded plots and 38 on managed control plots. The density of nests increased considerably (54.5 percent) on seeded plots but

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decreased slightly (7.3 percent) on the managed control plots. However, because the acreages searched on the two types of plots differed from 1963 to 1964, actual numbers of nests are not as highly indicative of changes in densities of nests between the 2 years as are establishment figures on an acreage basis. There was no great difference between the per acre nest densities for the two types of plots in 1963, but in 1964 there were nearly 1.8 times as many nests per acre established on the seeded plots as on the managed control plots.

Statistical tests were used to determine whether a significant difference existed between the number of nests established on seeded plots and the number established on managed control plots during these 2 years. In 1963, the numbers of established nests did not differ significantly between the two types of plots ($\chi^2_1 = 0.48$; $\chi^2_{10} = 2.71$). In 1964, the difference was highly significant ($\chi^2_1 = 7.94$; $\chi^2_{.005} = 7.88$).

Table 2. Number of established pheasant nests, and number of established nests per acre, on seeded and on managed control roadside plots, Sibley Study Area, 1963 and 1964.

Year	Acres		Number of Established Nests		Percent Change, 1963 to 1964		Number of Established Nests per Acre		Percent Change, 1963 to 1964	
			Seeded	Control	Seeded	Control	Seeded	Control	Seeded	Control
1963	15.37	15.03	44	41	-	-	2.86	2.73	-	-
1964	17.87	17.65	68	38	+54.5	-7.3	3.81	2.15	+33.2	-21.2

3. Factors Influencing Distribution and Abundance of Pheasants W. L. Anderson

Pheasants were captured by nightlighting on the Bellmont Study Area during October and early November, 1964, to (1) obtain a general index of abundance of pheasants on the area, (2) determine the sex and age composition of the population, and (3) obtain a series of body weights of pheasants reared on the area. During 21.8 truck-hours of nightlighting, 85 pheasants were found and 51 (26 cocks and 25 hens) were captured. Thus, averages of 15.4 and 25.6 truck-minutes of nightlighting were expended, respectively, for each bird found and each bird captured. During November 1963, an average of 12.7 truck-minutes of nightlighting was expended for each bird captured on the area (38 birds captured during 8.0 truck-hours of nightlighting). These indices suggest that the abundance of pheasants at Bellmont declined about 50 percent from the prehunt period in 1963 to the prehunt period in 1964.

The sex ratio among the 85 pheasants found during the prehunt period in 1964 was 136 cocks per 100 hens. Age ratios, expressed as juveniles per adult, were 7.7 and 2.6, respectively, among the 26 cocks and 25 hens captured, indicating that reproductive success was good on the area in 1964.

With respect to body weight, juvenile cocks and hens more than 14 weeks old averaged 2.74 ± 0.05 pounds (18 birds) and 1.94 ± 0.03 pounds (9 birds), respectively. These weights are similar to those of juvenile cocks and hens within the established pheasant range of Illinois.

4. Responses of Bobwhites to Habitat Manipulation

J. A. Ellis, R. L. Westemeier

Ninety-six bobwhites were captured by nightlighting on the Forbes, Dale, and Alma study areas during the fall of 1964. Forty-nine quail were captured on Forbes, 18 on Dale, and 29 on Alma. Age ratio among the 96 quail was 4.6 juveniles per adult or 82.3 percent juveniles in the sample. Cocks and hens occurred in almost equal numbers among the juveniles, but the adult sex ratio favored cocks. The high proportion of juveniles indicated good reproductive success in 1964. Although the number of quail captured on each area was small, the 88.9 percent juvenile segment in the Dale sample was believed to be representative, because a high rate of summer gain, 522 percent, was indicated when the results of the prebreeding census were compared with those of the prehunt census.

The nightlighting technique for capturing quail was less effective in the fall of 1964 than in the fall of 1963. In 1964, 38.1 percent (average) of the quail flushed were captured. The average for 1963 was 50.0 percent. Extremely dry weather during the trapping period in 1964 could have caused quail to roost in rough terrain near water, making them inaccessible to nightlighting vehicles. The fact that 16 of the 18 coveys located on the Dale Area during the prehunt census were within 100 yards of water tends to support this suggestion.

5. Responses of Prairie Chickens to Habitat Manipulation

R. J. Ellis

It has been reasonably well established that the most critical need of the waning populations of prairie chickens in Illinois is suitable nesting cover (Yeatter 1963:745, 749). Studies at Bogota show that grasslands undisturbed during the nesting period were nearly indispensable for successful nesting (Monthly Wildlife Research Letter, October, 1964). In view of these findings, any management of prairie chickens in Illinois should consider the status of grasslands suitable for prairie chicken nesting.

In order to detect trends in acreages devoted to grasslands, the cover on 10 areas where prairie chickens are censused annually (Monthly Wildlife Research Letter, April, 1964) was mapped to show land use in 1963 and 1964 (Table 3). On each census area the total acreage of grass undisturbed during the nesting period (grass hay, grass*) declined from 1963 to 1964 whereas the acreage of grain crops increased. Apparently this trend has been going on for several years (Yeatter 1963:741). In most areas of Illinois where chickens once lived, grasslands have become so scarce that the chickens disappeared. Unless some grassland suitable for nesting is preserved, the prairie chickens of Illinois will completely disappear.

Table 3. Land use on 10 prairie chicken census areas in Illinois, 1963 and 1964, expressed as percentage of total area.

	1963	1964
Row Crops	62.5	74.3
Soybeans	11.7	13.7
Legume Hay	2.3	1.6
Legumes*	.9	.6
Grass Hay	2.3	2.0
Grass*	4.2	3.6
Grass Pasture	9.2	6.7
Weeds*	.3	1.4
Trees and Brush	4.4	3.4
Other Uses	2.2	2.7
	100.0	100.0

* Idle fields.

Yeatter, Ralph E. 1963. Population responses of prairie chickens to land-use changes in Illinois. J. Wildl. Mgmt. 27(4):739-757.

6. Rabbit Management

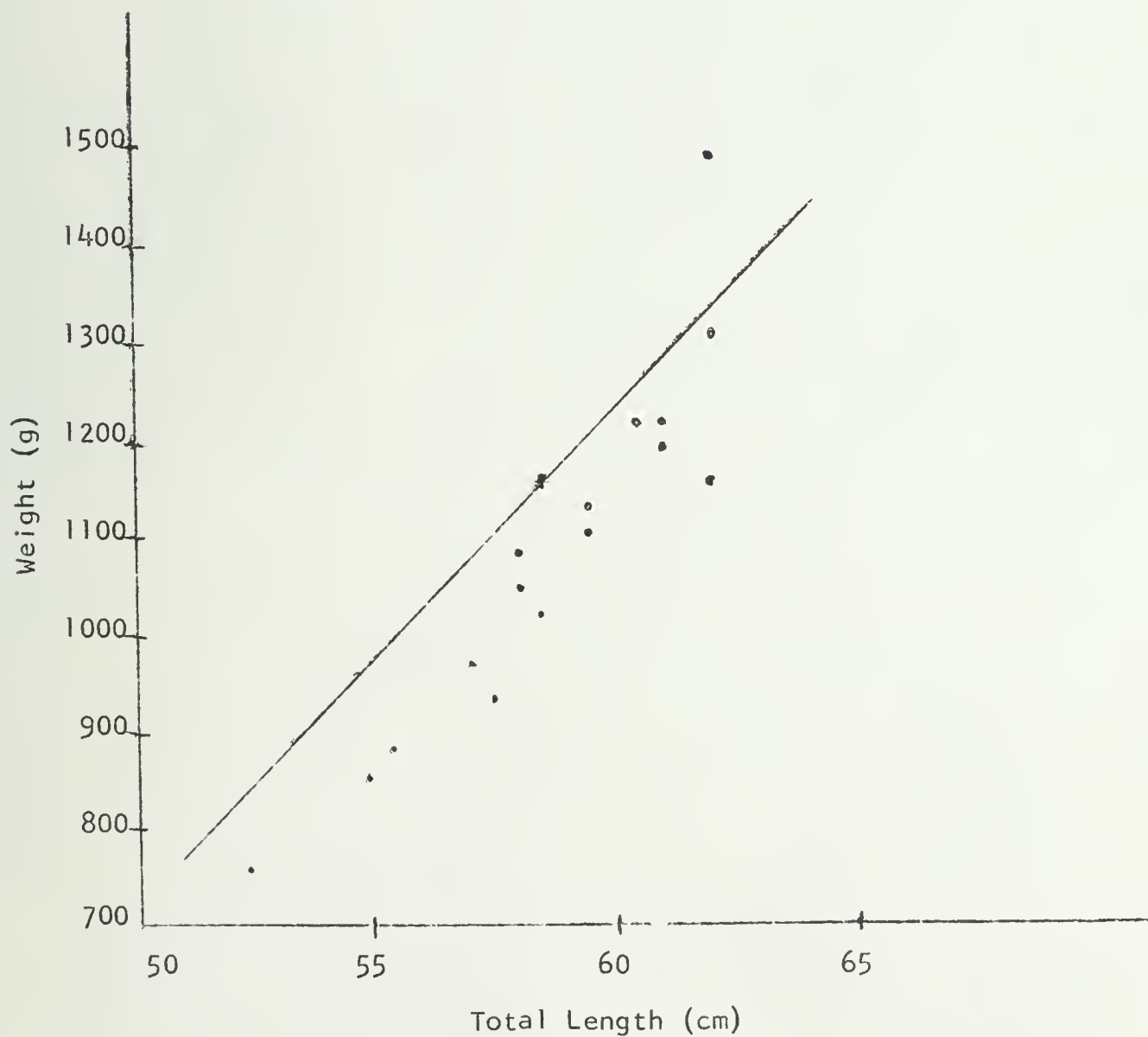
J. A. Bailey

Fifty-eight cottontail rabbits were livetrapped during the first 10 days of November 1964 on the Allerton Park 4-H Area. Of these, 31 had previously been captured and released on the area during September and/or October. Eighteen of the 27 rabbits captured for the first time during November were thought to be new immigrants onto the 4-H Area. Animals were designated as immigrants if they had not been caught on the 4-H Area prior to November and if their location of first-capture during November was along the west or north edges of the area. Corn was being picked and land was being plowed to the north and west of the 4-H Area in late October and early November. Movement of rabbits onto the 4-H Area was therefore expected.

The weight and total length of each animal were recorded. Total length is obtained by grasping a rabbit by the neck and hind legs, extending the animal, and measuring from the tip of the nose to the tip of the hind feet. It is thought that the physical condition of rabbits can be evaluated by comparing body weights of animals having the same total length. Accordingly, the weights and total lengths of the 31 known-residents and 18 suspected-immigrants were compared (Fig. 1). These data indicate that cottontails which moved onto the 4-H Area from adjacent fields being harvested and plowed were in poorer physical condition than the rabbits already present on the area. The poorer physical condition of the immigrating animals could have been the result of inadequate food on the farmed land or the effect of other stresses caused by the destruction of the animals' habitat.

The mortality rate of these two groups of rabbits is currently being studied.

Fig. 1. Evaluation of physical condition (based on the length-weight relationship) during early November, 1964, of resident and newly immigrating cottontails on the 4-H Area. The regression line was determined for the 31 known-resident cottontails. The 18 points represent animals suspected of being new immigrants to the 4-H Area.



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